UC-NRLF
B 2 957 468

Museum of Vertebrate Zoology

LIBRARY

OF THE

UNIVERSITY OF CALIFORNIA.

GIFT OF

J. A. Allen

BIOLOGY
LIBRARY
G

Class

University of California
Museum of Vertebrate Zoology

CONTENTS

1. New species of Sigmodon from Ecuador.
2. Note on Phoca nigra Pallas.
3. Mammals collected in northeastern Siberia by the Jesup North Pacific expedition.
4. New rodents from southern Patagonia.
5. Mammals collected in Alaska and northern British Columbia by the Andrew J. Stone expedition of 1902.
6. Mammals collected by J. H. Batty in New Mexico and Durango.
7. A new deer and a new lynx from the state of Sinaloa, Mexico.
8. New forms of the mountain goat(Oreamnos.)
9. Mammals from southern Mexico and Central and South America.
10. Palmer's 'Index generum mammalium'.
11. The external ear bone in certain rodents.
12. Further notes on mammals from northwestern Durango.
13. New bats from tropical America.
14. Mammals collected in Alaska by the Andrew J. Stone expedition of 1903.
15. A new sheep from Kamchatka.
16. New mammals from Venezuela and Colombia.
17. Mammals from Venezuela, collected by S.M.Klages.
18. The Tamandua anteaters.
19. Mammals from the district of Santa Marta, Colombia.

QL701
A5
v.4
BIOLOGY
LIBRARY
G

The Knickerbocker Press, New York

Article III. — DESCRIPTION OF A NEW SPECIES OF SIGMODON FROM ECUADOR.

By J. A. Allen.

The material on which the present species is based was kindly sent to me for determination by Mr. Oldfield Thomas, Curator of Mammals at the British Museum, with permission to describe it if new, and to retain the duplicates for this Museum. While the species represented by this material is nearly related to *Sigmodon simonsi*, it is well distinguished by certain cranial differences and by the less intense fulvous suffusion of the general pelage, especially that of the ventral surface.

Sigmondon puna, sp. nov.

Type, No. 30, female ad., Coll. Perry O. Simons (British Museum), Puná, Puná Island, Ecuador, Nov. 10, 1898; altitude 10 m.

Similar to *Sigmodon simonsi* Allen (this Bull., XIV, 1901, p. 40), from Eten, Peru, but less suffused with buff, especially on the ventral surface, which is only slightly or not at all tinged with pale buff instead of being heavily washed with clear deep buff; fore and hind feet grayer, and eye-ring paler. Skull with the anteorbital foramen much broader, and hence larger and differently shaped; the bullæ considerably more swollen, the dentition weaker, and the rostral portion of the skull shorter.

Measurements.—Head and body, 145; tail, 98; hind foot, 29; ear, 21 mm. Nine adults average: Head and body, 145 (140–160); tail, 98 (92–100, with one specimen 160); hind foot, 29 (28–30); ear, 20.6 (19–22).

Skull.—Type: Total length, 34; basal length, 30; palatal length, 16; length of nasals, 12; zygomatic breadth, 20; mastoid breadth, 14; interorbital constriction, 5; upper toothrow, 7. Six adult skulls range in total length from 33–36, and in zygomatic breadth from 18.5–20.

Sigmodon puna is represented by a series of 15 specimens taken at Puná, Puná Island, during the first half of November, 1898, they being among the first specimens collected by the late Perry O. Simons on the west coast of South America.

198484

About one half of the series are fully adult, with the teeth more or less worn; the others are 'young adults,' but none are very young, nor are any very old. To this species are referred four others collected at Guayaquil, on the mainland. They present the same cranial characters as the Puná examples, but three of them are much darker above and more grayish white below than the Puná series. As, however, one of the latter is indistinguishable from the three dark Guayaquil specimens, and one of the Guayaquil specimens is like the more buffy examples of the Puná series, this color difference seems to indicate two color phases—a gray and a slightly rufescent phase—rather than two geographical forms.

(*Continued from 4th page of cover.*)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. December, 1901. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. 1–28. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume	I, 1881–86.....	Price,	$5.00
"	II, 1887–90.....	"	4.75
"	III, 1890–91.....	"	4.00
"	IV, 1892	"	4.00
"	V, 1893	"	4.00
"	VI, 1894	"	4.00
"	VII, 1895	"	4.00
"	VIII, 1896.....	"	4.00
"	IX, 1897.....	"	4.75
"	X, 1898.....	"	4.75
Volume	XI, Part I, 1898,	Price,	1.25
"	" " II, 1899	"	2.00
"	" " III, 1900	"	2.00
"	" " IV, 1901	"	1.75
"	" (Complete).	"	5.00
"	XII, 1899.....	"	4.00
"	XIII, 1900.....	"	4.00
"	XIV, 1900.....	"	4.00
"	XV, Part I, 1901	"	3.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILIÈRLE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

(*Continued on 3d page of cover.*)

VOL. XVI, PP. 49 MARCH 19, 1903

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

Note on Phoca nigra Pallas.

In a recent paper on 'The Hair Seals (Family *Phocidæ*) of the North Pacific Ocean and Bering Sea' (Bull. Am. Mus. Nat. Hist., XVI, 1902, pp. 459-499), I suggested (*l. c.*, p. 483, foot note) that as Pallas's name *Phoca nigra* (1811), based on a young fur seal from the Kurile Islands, has priority over *Callorhinus curilensis* Jordan and Clark (1899), the Kurile Islands species would have to stand as *Callotaria nigra* (Pallas). I overooked the fact, however, that *Phoca nigra* Pallas is preoccupied by *Phoca grœnlandica* var. *nigra* Kerr (1792). Consequently the Kurile Fur Seal will stand as *Callotaria curilensis* (Jordan and Clark).—*J. A. Allen.*

Report on the Mammals Collected in Northeastern Siberia by the Jesup North Pacific Expedition, with Itinerary and Field Notes by N. G. Buxton.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XIX, Article IV, pp. 101–184.

New York, March 31, 1903.

The Knickerbocker Press, New York

UNIVERSITY OF CALIFORNIA

Article IV.— REPORT ON THE MAMMALS COLLECTED IN NORTHEASTERN SIBERIA BY THE JESUP NORTH PACIFIC EXPEDITION, WITH ITINERARY AND FIELD NOTES, BY N. G. BUXTON.

By J. A. Allen.

CONTENTS.

PAGE.
Introduction..... 101
Itinerary and Description of the Country (by N. G. Buxton)..... 104
Annotated List of Mammals (with descriptions of new species)... 119
American Affinities of certain East Siberian Mammals..... 182

Introduction.

This is the first of a series of papers on the zoölogical results of the Siberian Division of the Jesup North Pacific Expedition. Other reports will follow on the birds and fishes.

The natural history collections were made principally by Mr. N. G. Buxton, of Johnstown, Ohio, whose experience in arctic collecting at Point Barrow, Alaska, on the McIlhenny Expedition, in 1897–98, had especially fitted him for his work in Siberia. His 'Itinerary,' given below, fully describes the nature of the country visited, including its climatic and topographic features, while his field notes, given in connection with the species to which they relate, add greatly to the value of the present paper. Mr. Buxton collected mainly in the neighborhood of Gichiga, on the west coast of the Okhotsk Sea, but also at Marcova, on the middle Anadyr River, 600 miles north of Gichiga, and at some other points. Mr. Buxton's zeal and industry are attested by the large number of specimens he obtained in a country where the fauna is meager and the season for field work is limited to a comparatively small portion of the year. The fine condition of the specimens is evidence of his skill and care as a collector.

The present paper includes not only the mammals collected by Mr. Buxton, but also those obtained by other members of the Siberian Expedition. These comprise a few collected on the lower Amoor River by Dr. Berthold Laufer, a few taken

at Vladivostok, many collected at Marcova by Messrs. Buxton, Bogoras, and Axelrod, a considerable number from near the mouth of the Anadyr River and at Indian Point, on the extreme northeastern coast of Siberia, collected by Mr. Bogoras, and a small but very interesting collection made near Verkhne Kolimsk, on the middle Kolyma River, by Mr. Jochelson.

This report is restricted to the material collected by the Jesup Siberian Expedition, and is in no sense intended as an exposition of the mammalian fauna of eastern Siberia.

In this connection I wish especially to acknowledge my indebtedness to Mr. Gerrit S. Miller, Jr., Curator of Mammals at the National Museum, not only in securing for me the loan of valuable material for comparison, but also for kind assistance and advice.

The species treated in the present paper number 35, of which 29 are represented by specimens, and 6 are presented simply on the basis of Mr. Buxton's field notes. The number of specimens of mammals in the collection is about 500. Several of the species here recorded appear to have hitherto escaped recognition. These, including two seals described in a previous paper [1] based primarily on the Buxton material, are the following:

Ochotona kalymensis.
Lepus gichiganus.
Citellus buxtoni.
" stejnegeri.
Evotomys jochelsoni.
" latastei, nom. nov.
Lemmus obensis chrysogaster.
Phoca hispida gichigensis.
Vulpes anadyrensis.
Putorius pygmæus.
Erinaceus orientalis.
Sorex buxtoni.

As would be naturally expected, the present investigation brings to light several new illustrations of the intimate relationship of the mammalian fauna of Siberia with that of Alaska. A small shrew (*Sorex buxtoni*, sp. nov.) finds its nearest relative in *Sorex pribilofensis* Merriam of the Pribilof Islands; the large spermophile of eastern Siberia finds its nearest ally in the *Citellus parryi* group of arctic and subarctic America, and not in *C. eversmanni* of the interior of Siberia. The small weasel of eastern Siberia proves not to

[1] This Bulletin, Vol. XVI, 1902, pp. 459–499, figs. 1–10; Dec. 12, 1902.

be a member of the *Putorius nivalis* group, but a near relative of *P. rixosus* Bangs of arctic America. It is not surprising that some of the seals of the genus *Phoca* should be found to range along the coast of Siberia from Okhotsk Sea to Point Barrow, but it is interesting to note that these do not include the Pacific Coast Harbor Seal (*Phoca richardii*), and also that the Harp Seal (*Phoca grœnlandica*) does not pass through Bering Strait into Bering Sea, as formerly believed, its supposed records of occurrence here apparently resting on the misidentification of young males and females of *Histriophoca fasciata* for this species.[1]

It may be further noted that the skins of many fur-bearing animals are imported from Alaska into northeastern Siberia. Thus among a lot of peltries purchased at Indian Point (Chaplin Point of most maps), on the Chukchee Peninsula, by Mr. Bogoras and brought to the American Museum, are skins of the Lynx, Otter, Beaver, Red Fox (in its various phases), Arctic Fox, Blue Fox, and Sable, which are readily recognized by expert furriers as of Alaskan origin. Of course, none of these are formally included in the present report. Respecting the Beaver, I find the following in Mr. Buxton's notes. Mr. Buxton says: "I was assured by Mr. Sokolnikoff, as well as by many others, that there are no Beavers in northeastern Siberia, and that all the skins that one sees there are obtained from the American whaling fleet by the Chukchees, who in turn trade them to the Russians at Marcova and the settlements along the Kolyma River. They bring from ten to fifteen roubles each."

The external measurements given in this paper were taken from the fresh specimens by the collector, unless otherwise stated, and are expressed in millimeters. Mr. Buxton's field notes follow the technical matter under each species, and are placed in marks of quotation and followed by the initials, 'N. G. B.' In several instances some of his unpublished notes on mammals met with by him at Point Barrow are here inedited, on account of their special interest in the present connection.

[1] See this Bulletin, Vol. XVI, 1902, pp. 475–477.

Itinerary and General Description of the Country.

By N. G. Buxton.

On March 16, 1900, I received instructions at New York to proceed immediately to San Francisco, purchase my outfit, and be in readiness to sail with the Jesup North Pacific Expedition for northeastern Siberia on April 10, which had already been organized and equipped for an ethnological survey of that country.

Accordingly I left New York March 24, going by way of New Orleans and thence over the line of the Southern Pacific Railway Company, whose officials had kindly furnished me with transportation, and arrived at San Francisco April 1. Mr. W. Jochelson, leader of the expedition, and Mr. Bogoras came on the 9th, when it was decided that it would be impossible to get away on the 10th as we had expected. However, by the end of the following week we had so far completed our outfits and arranged the details necessarily incident to such an undertaking, that we engaged passage on the Oriental and Occidental Steamship Company's vessel 'Doric,' which sailed on the 17th. After an uneventful voyage of six days we sighted the Sandwich Islands, and that afternoon, April 23, rounded Diamond Head and docked at Honolulu. One day was spent here, when we resumed our journey, and on the 4th of May reached Yokohama, where we remained four days; we made Kobi on the 9th and Nagasaki on the morning of the 11th. We left the same day at midnight, on the Chinese Eastern Railway Company's steamer 'Mukden.' Fusan, on the Korean coast, was reached May 12, Gensan the 14th, and on the 16th we anchored in the harbor off Vladivostok.

According to our plans, Mr. Bogoras was to proceed north to the Gulf of Anadyr while Mr. Jochelson, Mr. Axelrod, whom we found here awaiting us, and myself were to go to Gichiga at the head of Okhotsk Sea. We found that the next vessel for the latter place would sail in about ten days, which was too soon for us, as we still had to get our official papers, buy our staple provisions and trading goods, complete our outfits, and

divide and repack the goods that had already been purchased in Europe. Mr. Bogoras was more fortunate, as the one vessel which visits the Anadyr country annually did not sail until June 14.

As the next vessel for Gichiga was not to sail until July 24, I had considerable time at my disposal, which I employed in making a collection of the fishes found in the harbor at Vladivostok and the Gulf of Peter the Great. There are no streams in the vicinity of Vladivostok where fresh-water fish could be taken, so on May 27 I went by train to Nikolsk and posted from there by telegas to Lake Khanka, a distance of ninety miles, arriving on the 29th. Governor Chichigoff had kindly wired the officials along the way of my coming, provided me with letters of introduction, and an official request for post-horses, so that notwithstanding my inability to speak the language I got along very well. At the lake I was entertained by Mr. Shubenko, who had two or three cabins there and employed twenty Korean fishermen during the summer and supplied the Nikolsk market with fresh fish. This lake is a shallow, gradually shoaling body of water, lying between 44° 30′ and 45° 30′ N. and 132° and 133° E. It is about 50 miles long, 40 miles wide, and 225 feet above sea-level, and is surrounded by extensive marshes which drain into the Sungari River, a tributary of the Amoor. Through the interest my host and his men took in my collection I was able to fill my tanks in one week and secure specimens of all the food fishes that occurred there at that season of the year, although the smaller and probably more interesting ones I did not get on account of the lack of necessary means. Early on the morning of June 5 the telega which I had ordered from Kamenribiloff, a post station one mile distant, called for me and after a wild, rough ride of six relays I reached Nikolsk at midnight and returned to Vladivostok the next day.

On June 18 the steamship company told us that a vessel would be despatched for Gichiga between the 20th and 28th of June, so we renewed our efforts to get everything in readiness, and felt hopeful of getting in the field before the short, northern summer had passed, when, on the 21st, rumors of the

Chinese trouble reached us. This caused the company to declare the sailing of this vessel off, and made them undecided about sending the one scheduled for July 24, as all ships were being pressed into the government transport service. Then followed for us an anxious and exciting month, as inhabitants of a Russian fortified port in active war times. Thousands of soldiers arrived daily from the interior and departed in transports for the front; missionaries and merchants came from Manchurian points up the Amoor River; the Chinese stopped work and fled the city; martial law was proclaimed, and commerce came almost to a standstill. Finally we were assured that the 'Khabarovsk' would leave July 23, and on that date our party took passage on it. Our course lay north along the coast between the mainland and Saghalin Island, and our voyage was without incident until the 28th, when we went aground in the shallow, tortuous channel off the mouth of the Amoor River. After waiting three days for an abatement of the wind and a high tide, the water-ballast tanks were pumped out and we floated again. August 2 we came to anchor in Udskoi Bay, back of Great Shantai Island, discharged a small amount of cargo for the little settlement there, and were soon under way again for Ayan.

The small number of sea-birds observed along the Siberian coast, as compared with the large number one encounters on the Alaska side in the same latitude, is very striking.

August 3.—Anchored in the beautiful little harbor of Ayan this evening. This place, possessing the only harbor on the Okhotsk Sea, is nicely situated at the toe of a small horseshoe-shaped indentation in the rugged coast-line. The settlement consists of a few large log storehouses and small dwellings and the inevitable blue-domed church. During the palmy days of the whaling industry it was used by the Americans as a recruiting place, and as a landing place for vast quantities of birch tea, which was sent from there inland to the settlements along the Kolyma River by reindeer during the winter months. Now, since the whalers no longer visit these waters, and the shorter and better route from Ola was discovered, it has lost its importance and the few inhabitants are mostly

employees of the Russian Sealskin Company which owns the magazine and most of the buildings. After spending a couple of hours ashore in collecting flowers which grow abundantly here, climbing the larch- and fir-covered hills, and taking photographs, we left again the same evening.

August 4.—To-night anchored in the open roadstead three miles off Okhotsk. The village, consisting of about a hundred weather-beaten log houses, is situated on a tongue-shaped sand-spit that separates the sea from the lagoon which forms the mouth of the Okhotsk River. The coast, from about four miles above to fifteen miles below the town, is low and extends inland as a wide flat valley through which winds the river. Besides being one of the largest settlements in the marine province of Northeast Siberia, and an important trading centre, Okhotsk is known as the best place on the Okhotsk Sea for salmon. Two species, and perhaps more, are taken here in large numbers, and many of them are smoked and salted and sent to Vladivostok. Fish taken further north in the sea are poor and pale in color. Hundreds of seals were congregated at the mouth of the lagoon catching the fish as they entered the river. Salmon could undoubtedly be taken here in sufficient numbers to supply a cannery, and of very good quality. We remained here five days discharging cargo and left on the 9th and reached Ola the next afternoon. This little collection of Russian and Tungus huts was brought about by the recent discovery of a short and practicable route from here to the headwaters of the Kolyma River. It is located similarly to Okhotsk, on a lagoon formed by the mouth of the Ola River, which has thrown down a large deposit of gravel in the valley between the mountains which end on the sea in high bluffs. Larch and fir trees crowd the river-bottom down quite to its mouth.

August 13.—Resumed voyage to Gichiga, and on the 16th came to anchor in the Gichiginski Gulf and went ashore.

Three miles above the mouth of the Gichiga, on its left bank, is a collection of blockhouses called Kooshka where the commanding officer, or nechalnik, and his assistants live. Here we took up quarters in a cabin which had been occupied

by the government storekeeper and his family, all of whom had died the previous winter from an epidemic of measles and pneumonia, which took off nearly 150 of the inhabitants of the Gichiginski settlement. We were occupied for the next ten days in landing, storing, and dividing our freight.

Mr. Jochelson had expected to find the Koryaks here in their summer camps along the coast, but as they had already abandoned them and returned to their herds and permanent sites he prepared to go to the settled Koryak villages along the head of the Penginski Gulf, and he and the rest of the party left for Parane with a pack-train on September 10.

A large party of Russian workmen, in charge of four American mining engineers, and employed by an English exploration company, arrived from up the river on the 13th, where they had been prospecting for gold. I purchased from them some much-needed provisions, the obtaining of which had been neglected in Vladivostok. On September 24 they sailed on their ship 'Progress,' in company with the 'Mukden,' which had arrived that day, thus breaking the last link that bound me to civilization.

The migration of the birds was already advanced when we arrived, so I immediately set to work to get as many as possible before the long winter closed down, but was unable to accomplish much on account of our cramped quarters and other work until after the departure of Mr. Jochelson.

The coast-line of the Gichiginski Gulf, formed by the mainland and the Taiganose Peninsula, rises boldly from the water to a height of two to three hundred feet, except at its head, where it is low and marshy and entered by the Gichiga and Ovecho Rivers. These two rivers, with their tributaries, drain the triangular valley between the Stanovoi Mountains on the west and a spur which extends south from them and forms the backbone of the Taiganose Peninsula. This valley is a high, rolling tundra, dotted with numerous lakes and pools, and destitute of trees except on some of the dry, elevated places where there is a scant growth of recumbent stone pine, and along the river-bottoms. The mountains to the eastward attain at one point, Babooska, 18 miles from the mouth of the

Gichiga, a height of 1500 to 1800 feet, while those 40 miles distant to the southeastward rise to 3500 feet or more. No timber is found on them. The smaller valleys which the Gichiga and Ovecho have cut out are separated by a high, triangular section of country, which begins at the head of Gichiginski Gulf as a high cliff of recent sandstone, half a mile wide and called Maiak Point, and which separates their mouths. The Gichiga is a rapid, shallow stream about 70 miles long, and flows in a generally north and south direction. At Kooshka, three miles above its mouth, it is 175 yards wide; below this point it rapidly broadens and is filled with bars and flats. The Ovecho is somewhat smaller and flows in a southwesterly direction from the Taiganose Mountains. The river-bottoms near the sea are destitute of trees, but further up they are filled with small willows and alders, and at a distance of 25 or 30 miles contain a thick growth of larch large enough for building material. Still further up there are also birch and poplars.

Formerly the mouth of the Gichiga River was four miles above its present location, where the river is hemmed in by hills on either side, but the gradual rising of the whole valley, shown by the deep deposit of waterworn material all over it, and the deposition of silt at the head of the Gulf, have moved it down to its present position at Maiak Point. At low tide the bottom of the Gichiginski Gulf is exposed for a distance two miles out from Maiak Point as a great mud-flat, extending clear across the head of the Gulf, a distance of eight miles. On this account the vessels anchor about 20 miles out from Maiak, opposite the rocky inlet, Matuga, on the Taiganose side, in 12 fathoms of water. The tides are high and irregular. The difference between high and low water is perhaps nearly 20 feet, and at high tide the water is backed up in the rivers for nearly four miles. It is only at this time that one can row a boat up-stream: above slack water it must be towed.

The town of Gichiga is situated on the east bank of the Gichiga River, 15 miles above its mouth, and is one of the oldest settlements in Siberia, having been located by a party

of Cossacks about the middle of the 18th century. Most of the people now living in this section of Siberia are descendants of these early settlers and the native women, principally Chukchees, whom they took for wives. The population of Gichiga, Christova, Kooshka, and the few isolated fishing stations along the river, numbers about 375. Nearly all of the able-bodied men are enlisted as Cossacks and provided with rations by the government. The affairs of the colony are administered by the local governor, or nechalnik, and his two assistants.

The salmon, which ascend the rivers in immense numbers during July and August, when they are caught and dried, constitute the people's chief supply of food. These, together with the reindeer they obtain from the Tunguses and Koryaks, the wild fowl which they shoot in the summer, and the plain birch tea and sugar which they get from the traders in exchange for work and furs, complete their bill of fare. Owing to the limited resources of the country very few of the inhabitants are able to obtain anything more than a poor existence from it. While many valuable skins and furs are received yearly by the traders at the few scattered settlements in Northeast Siberia, still the territory that they represent is so vast and so thoroughly travelled by the numerous wandering natives and hardy Russians that one finds an amazingly small number of fur-bearing mammals, or indeed of any kind of animal life that will serve for food, in any limited area. Northeastern Asia has undoubtedly for centuries had a vastly larger native population than northeastern America, and the natives there have been in contact with Russians, and acquainted with the use of firearms, for nearly 250 years, so that to-day the animal life of northern Siberia, outside of the timbered portion, is less than that of the barren portion of Alaska.

Snow begins to fall in the valleys the first week in October, and the rivers and lakes freeze over a few days later. The snow falls at intervals from this time on until the middle of May, but probably does not exceed a depth of eighteen inches on the level. However, this is a hard matter to determine, as

strong winds blow almost continually from the northeast and the southwest and pile the snow in huge drifts wherever there is any obstruction. Further inland, away from the seacoast, the winds are not so frequent and the winter weather is pleasanter. There is much overcast and foggy weather, yet the annual precipitation probably does not exceed eighteen or twenty inches, which is quite equally distributed throughout the year, July and August being the dryest months. The temperature at Gichiga ranges from 80° F. to — 40° F. or more, the warmest weather occurring in August and the coldest in January. As soon as winter sets in the people tie up their dogs, repair their sledges, and make everything ready for the long cold season, which is really their most active one, and from this time on until the snow disappears in the latter part of May, they travel almost continually, going in all directions, visiting the Tungus and Koryak lagers and Russian settlements, engaging in trade for themselves or the merchants. The abundance of fish enables every man to keep from ten to sixty dogs. Ten to sixteen constitute a team, although twelve is the usual number. They are hitched in pairs to a long line attached to the sledge, and are trained to drive by word. All of the native Russians are very expert in handling these teams and are the most accomplished travellers on the road that I have ever met in the 'high north.' A good team, with a moderate load, will cover from six to ten miles per hour and is capable of travelling continuously, when necessary, forty-eight hours without food. Satisfactory travelling in the north is limited to the winter months, as the country in the summer, owing to the vast extent of boggy tundra and numerous lakes and rivers, is almost impassable for horses. Mr. Jochelson was seventeen days in September in going with horses from Gichiga to Parane, and later I made the same trip with dogs in thirty hours of continuous travel.

From the time the migratory birds left in the fall until their return there was comparatively little to be accomplished, especially in such a long-settled, thoroughly travelled, and barren country as that section of Siberia, where there are no large wild mammals and few active small ones, and only a

small number of resident birds. Although I secured series of all these winter forms, and of some of them large series, still the work was insufficient to occupy my time, and as I had nothing to read and was unable to carry on any extended conversation with the few people who found their way to my cabin, I passed a very monotonous winter. Many days I was unable to leave the house on account of the severe windstorms which filled the air with snow so that one could not see twenty yards away.

In the latter part of November I took three sledges and visited a large herd of Koryak reindeer which were at that time herded at the base of the mountains fifty miles to the eastward, and selected specimens suitable for a group.

Mr. Jochelson returned to the Kooshka on January 29 from his wandering among the Koryak lagers. I learned from him that there was a number of specimens at Marcova which Mr. Bogoras had sent and which needed my attention. I had originally intended to remain in the vicinity of Gichiga only until March and then go to Marcova and to the mouth of the Anadyr River and await the one steamer which comes there every summer, and return by it to Vladivostok. But on account of my late arrival at Gichiga, the early departure of the vessel from Anadyr the following summer, and consequent shorter time in the field, and other reasons, I decided to alter my plans and put in all my time in the Gichiga territory. However, after consulting Mr. Jochelson, and knowing that there was nothing to be gained by remaining at Kooshka, I decided to go to Marcova, prepare whatever material had accumulated, collect anything else possible, and return to Gichiga in the spring before the snow left and the birds arrived.

I engaged two Cossacks and two sledges with fourteen dogs to each, and on February 21 left Kooshka for Marcova. Marcova is situated on the middle Anadyr River, 500 miles from its mouth and 600 miles from Gichiga. The route over which I was to go was the same as that travelled by the Russo-American Telegraph Company's party of Americans in 1866–67, and so thrillingly described by George Kennan in his

'Tent Life in Siberia.' Since their time I was the first American to make the trip. I left Kooshka at noon February 21, and although the road was heavy from the recent severe snowstorm, we covered the twelve miles to Gichiga in an hour and a half, where we stopped over night. Next day we went as far as Christova, a little settlement of five houses, twenty miles further up the river, and stopped for the night.

February 23.—Fair, calm. Got away at daybreak and followed up the valley of the Chooma River until noon, where we stopped half an hour for tea. Here we left the river and our way for the rest of the day lay across the vast rolling tundra which stretched away in billows of spotless white to the distant mountains whose outlines could be traced on the pale blue sky. At dusk we found a place on the crest of a hill, where we could obtain enough creeping-pine to make a fire, and stopped for the night. After tea and a cup of soup I turned into my 'pavoska,' or covered sledge, and my Cossacks lay down on the snow beside it and slept soundly until morning. Weather too cold for my thermometer, which registers only $-24°$ F.

February 24.—Strong northeast wind blew all forenoon, which filled the air with snow, and later in the day much snow fell, which made travelling slow and laborious. Met two men from Anadyr at noon, and late in the afternoon met six traders. Camped at dusk and made a fire of green stone-pine which we dug from under the snow. The ease with which the Cossacks start a fire, even with a fierce wind blowing, and the celerity with which they prepare tea is wonderful and never ceases to excite my admiration. Twenty minutes after stopping they have a kettle of snow melted, the water boiling, and the tea ready to serve.

February 25.—Strong north wind and overcast. Broke camp at daylight and reached Parane River at noon, where we stopped for tea. Some of the cottonwoods along this river were 40 feet high, and 18 inches in diameter. Just at dusk we reached Quail, a Koryak settlement of ten yomtas, and stopped for the night.

February 26.—Crossed the head of the bay upon which the

settlement was situated and then followed the general direction of the coast-line, cutting off the headlands and approaching the sea in the lower places. Mountains visible in all directions. Crossed long stretches of barren tundra, followed three small rivers for short distances, and finally reached Mickina, where we remained in a Koryak yomta for the night.

February 27.—Reached Shestacova at noon and decided to lie over here until next day, as the next settlement is two to three days' journey. Occupied the day in repairing our freight sledge, buying fish for our dogs, and repacking our sledges. This was formerly a large settlement, but various diseases and epidemics have reduced it to two yomtas. It is situated on a little bay at the mouth of a small river. This and the last place are on the direct line of flight of ducks and geese on their migrations, and they are known as the best places along the head of Okhotsk Sea for shooting them.

February 28.—Turned out at 4.30 and were off at 5 A.M. Our way led up the Shestacova River. Five miles above its mouth its shallow valley suddenly narrows where it cuts through a ledge of basalt, and from that point up it is shut in by mountains on either side. Three miles further we struck into a cañon on the right and began to climb the mountains. Reached the summit, 380 meters elevation, at noon, and after a short stop for tea began the descent. Far below us lay the broad valley of the Ocklan River, whose winding course was marked by the thick growth of trees along its bottom which showed black against the snow. Reached the river late in the afternoon and made camp. Snow so soft we had to break track with snow-shoes.

March 1.—Reached Ooskou Pass, out of the valley (elevation 360 meters), at 3 P.M. The descent was so steep that my sledge capsized and the dogs threatened to run off with us until the driver stopped them and quickly slipped one hind leg of each dog through the harness, this making them three-legged, when we made the rest of the descent in safety. Reached Ooskou at night and camped. Next day, the 2d, reached Pengina, a Russian settlement of fifty-seven people, on the Pengina River. Remained here next day to repair sledges

and rest the dogs for the last stage of our trip. The starosta, or head man of the village, in whose house I stopped, assured me that there was neither flour nor sugar in the settlement, and that all they had to live on was fish, reindeer, and tea. Between here and Marcova there are four small log houses at convenient intervals for the accommodation of travellers when caught in one of the numerous protracted storms which occur.

March 4. — Got away at daybreak and reached the first station on the Chorna River at 3 P.M., when we stopped for tea and then pushed on, the moon being full, until midnight, when we reached the next station. My sledge was ahead and we had arrived, started a fire, unpacked our sledge, and fed our dogs before the other Cossack arrived. His sledge, which was heavily loaded with our outfit and provision, had broken through the ice in crossing a small river and it was with difficulty that he escaped drowning and saved the sledge. Our small supply of sugar and hardtack was soaked, but the canvas in which the main part of the load was lashed somewhat protected the rest of the outfit. After a few cups of boiling tea, some boiled dried salmon, and a kettle of soup, we turned in and slept until 5 A.M., and then resumed our journey. We soon crossed to the headwaters of the Orlofky River and reached the last station at 3 P.M. Encountered a howling blizzard in the Roosky Pass, which separates the Orlofky from the Anadyr valley, and lost our way, but finally got over the pass and reached Marcova at 9 o'clock, where our arrival was heralded by a chorus of the entire dog population. I found Mr. Axelrod and Mr. Bogoras, and the next morning called on the nechalnik, Mr. Sokolnikoff, and the priest who has been here since 1862 and of whom Mr. Kennan speaks in his book. I found people in Gichiga, Pengina, and Marcova who still remembered the members of the telegraph exploration party, and fondly recalled how the 'Americanskis' skated, danced, snowballed, and played ball, and not a few of them still retained a few words of English that they had learned at that time. During the winter of 1899–1900 a Chukchee brought to the nechalnik at Marcova a letter written by Lieutenant Macrae, dated September 25, 1865, which stated that he and

four comrades had been landed at the mouth of the Anadyr River and had been kindly received by the native Chukchees. This letter was written with a pencil on a leaf torn from a notebook and was tied up between two pieces of thin board, after the custom of the country. It was as clean and legible as the day it was written, notwithstanding that it had been carried thirty-five years by the wandering Chukchees before being delivered.

Marcova is a little collection of rough log cabins clustered about the conventional blue-domed Greek Russian church and has, with the outlying fishing stations along the river, a population of about 400. It is situated one half-mile from the Anadyr River, on one of its small tributaries. It requires nine days to go by boat from Marcova to the river's mouth, and fourteen days to return, during the summer. The same journey is made with dogs in the winter in five days. The river is navigable for boats, with a draught of two and a half to three feet, from its mouth to a point fifteen miles below Marcova. Its bottom is thickly lined with a growth of cottonwoods, alders, birches, and willows.

Salmon and herring ascend it during the summer, and several species of *Coregonus* are caught from it in large numbers, especially during the winter.

Mr. Axelrod had prepared most of the few specimens that had been sent, so that after preparing the balance I had but little to do and turned my attention to making a collection of the fish found in the rivers there. In company with Dr. Calleenen we made daily trips to the streams, set nets under the ice, and explored the surrounding country on snow-shoes. Mr. Sokolnikoff gave me a collection of birds that he had made, and I secured much valuable information from him concerning the country between Marcova and the Gulf of Anadyr. The winter weather is very superior to that at Gichiga, and every day I was there it was cold, clear, and calm.

Late on the night of March 21 word was received from Mr. Bogoras, at Baronesskorf Gulf, that he was in poor health and was returning from Kamchatka to the mouth of the Anadyr River, whence he would depart for the north as soon as Mrs.

Bogoras, Mr. Axelrod, and Mr. Sokolnikoff could join him there; consequently I gave orders to my Cossacks to prepare to leave on the 23d. At one o'clock that day, after bidding good-bye to Mrs. Bogoras, Mr. Sokolnikoff, and his secretary, Mr. Dedenko, Dr. Calleenen, Mr. Axelrod, and the host of kind people who had gathered to see me depart, I was lifted into my pavoska by my faithful Cossacks, who released their frantic dogs and we went dashing out of the village in a cloud of snow which glittered like diamond dust in the bright sunlight. Our return journey was uneventful except for being lost in a blizzard one day between Mickina and Quail, when our sledges became separated and again met, each going in opposite directions, after several hours' wandering. The distance from Quail to Christova we accomplished in thirty-six hours of continuous travelling, where we arrived April 1, and on the following day we reached Kooska.

The tide-water broke through the ice on the river April 21, but it was not until May 26 that the ice moved out of the river. The snow began to disappear from the tundra about the middle of May, but was not entirely gone before the first week in June. Where it was heavily drifted, in ravines and along the coast, some remained all summer. In the middle of May I went with sledges to the rocky islets lying along the Taiganose Peninsula, travelling over the ice across the head of the Gichiginski River. Later in the season I again visited these places several times, and also made one trip down the mainland coast as far as Varkhalam Bay.

The first birds arrived about the 20th of April, but no species became common before the end of the first week in May, and the height of the migration was not reached until the last week of May. None of the sea-birds, except the gulls, come up the bay further than Chaibuga Point, some six or seven miles south of my station, and all the other birds stop but a few days at the mouth of the river before continuing their journey inland, where they breed.

The long, vigorous winter suddenly jumps into the short arctic summer, and the grass and flowers spring up before the land is entirely free from snow. The vegetation is abundant,

and the beauty of the flowers is very striking. The grasses, of which there are a number of species, grow very rank in favored places. The summer season of eight weeks, when there are no frosts, together with the moist atmosphere, makes it possible for the people to grow turnips, beets, and carrots in their small, carefully prepared gardens. The mosquitoes, which are the worst feature of life in Northeast Siberia, arrive the first week in July and simply dominate the country for one month. It is impossible to obtain a minute's rest from their attacks during that time.

On the morning of June 16 the first ship of the season arrived, which brought me the first letters and news from the outside world that I had received for ten months. The summer passed quickly, and on August 26 the SS. 'Girin,' from Anadyr, arrived with Mr. Bogoras's collection aboard, he having left the ship at Petropavlovsk, and was detained fifteen days at Gichiga, owing to inclement weather, in discharging her freight. As this was the vessel that was expected to make the next and last trip of the season to Gichiga, and was then more than one month overdue, the captain assured me that it was improbable that there would be another vessel that season, and as the migration was nearly over I decided on September 7 to ship on the 'Girin,' and packed up my collection and closed out my outfit on the 8th and left for the ship that night, arriving there early next morning. Sailed at noon on September 9, stopping at Ola, Okhotsk, and Ayan, and reached Vladivostok on September 28. Found Mr. Bogoras there, and we spent the next two weeks in repacking and arranging our collection for shipment. After several days' delay we finally succeeded in securing a permit from the Governor-General of Eastern Siberia and the constructing engineer to go over the then uncompleted railway, and on October 14 Mr. Bogoras and myself left Vladivostok for Russia. I was the first foreigner that had been favored with a pass over this route, and I was fully repaid for the time I had spent in Vladivostok in obtaining it by the time we gained in crossing Siberia by this route. Our papers were honored at every place along the line, and we were hurried

along on construction trains and special trains, and furnished with government post-horses over the uncompleted section of more than one hundred miles through the Khingan Mountains, so that we reached Irkutsk thirteen days later, and Moscow on November 5; was in St. Petersburg on the 10th, Berlin on the 15th, Paris on the 17th, and sailed from Cherbourg on the 'Kron Prinz Wilhelm' for New York on the 20th, where I arrived November 26, 1902.

During my stay in Siberia I was placed under many obligations to many of the Russian government officials and private citizens, to whom my cordial thanks are hereby extended. I am especially indebted to Governor Chichigoff of the Premorski Province for official letters to the various officers of the posts under his jurisdiction and for an excellent botanical collection from Eastern Siberia; to S. I. Ankoodenoff, Commandant at Gichiga; S. I. Pahderin, Captain of Cossacks at Gichiga; and to N. P. Sokolnikoff, Commandant at Marcova, who gave me much valuable information concerning the Anadyrski country, and also a small collection of birds and mammals. To all the people of the settlements of Ayan, Ola, Okhotsk, Gichiga, and Marcova, and in fact to all the Russians with whom I came in contact, I am deeply indebted for their unlimited hospitality and uniform good-will.

Annotated List of Mammals.

1. **Delphinapterus leucas** (*Pallas*).

White Whale.

Represented by a fœtal specimen. Most of the field notes and the measurements relating to this species were made by Mr. Buxton at Point Barrow, Alaska, in 1898.

"Abundant, probably remaining in the Okhotsk Sea the entire year. During July and August, when the salmon are running, they are especially abundant in the Gichiginski Gulf. At that time, when the tide is high, they come in to the head of the Gulf just off the mouth of the Gichiga and Ovecho Rivers

in hundreds and go out again with the tide. In the summer of 1899 a party of Koryaks who were encamped just below the mouth of the Ovecho River surrounded a school, which had ventured in nearer to the mouth of the river than usual, with their bidarkas, and succeeded in keeping sixteen from returning to the sea until the tide went out and left them stranded on the great mud-flat thus left exposed.

"On October 16, 1900, a fœtus (No. 301 in collection) was brought to me which had been taken from a female killed off the mouth of the Gichiga River a few days previously.

"A Finn now living at Gichiga was formerly employed there by the American Trading Company in catching 'white fish' for their oil. The Russian name of the white whale is *Bi-loo-hah*, and not *Bi-loo-gah*, as the American whalers call them, which is the Russian name for a large species of sturgeon.

"The following unpublished notes were taken at Point Barrow, Alaska, in 1898. — On the morning of May 3, Mr. Chas. Brower of the Cape Smythe Whaling and Trading Company sent word to Mr. McIlhenny that a native had just arrived from one of his floe whaling camps with word that they had found a school of white fish in a 'hole' and had already killed 70. Mr. McIlhenny and his Japanese cook, together with two Eskimos and dog team, set out immediately for the scene. That night the cook returned with a note to me asking for a dog team and natives. Next morning I started with four Eskimos and a sledge. After a rapid journey of five hours over the sea ice we reached the 'hole.' On the way we met more than twenty different gangs of natives with sledges loaded with 'white fish' skins and meat.

"On May 2 the wind blew lightly from the northeast until 3 P.M., when it hauled to the southwest and drove the ice-pack in and closed up the series of holes between the pack-ice and the land-floe, or 'ice-foot,' attached to the shore, except one which the whales had found.

"At 10 o'clock that night some of the Eskimo from the whaling camp who had gone out after seals discovered the fish imprisoned in this hole. The hole when first discovered was about 150 yards long and 50 yards wide, but when I

reached there the young ice had formed around the edges until it was only 60 by 20 yards. The water was about 30 fathoms deep. At the time of my arrival, there were 150 carcasses, some with the skin, meat, head, flukes, and flippers removed and others untouched, lying on the ice, while nearly one half that number were tied up to the edge of the ice in the water. Over 100 more were still alive in the water. These rose to 'blow' every twelve to eighteen minutes and then made from ten to fifteen blows, sometimes making two in swimming the length of the hole, and then, turning back, repeating the operation several times before again descending. The inspiration and expiration required not more than one or two seconds and sounded like an exaggeration of the noise produced by a person rounding the lips and blowing. Over one hundred Eskimos were there, and new parties were continually arriving and others departing as they got their sledges filled. All of the new arrivals immediately tried their skill at shooting, although there were many more killed than would supply their wants.

"The whales in rising came up with the forward part of the body elevated, pushed the top of their head out of the water, and 'blowed,' and then, with tail depressed, back elevated, and head pointed downward, disappeared again, seldom showing the fluke. This gave the appearance of a circular disc revolving in the water with only about one fourth of its diameter exposed. The head was seldom raised enough to show any part of it below the eye. Some rose and swam for some distance parallel with the surface of the water, but most of them described sharp curves. Although all did not rise at the same time, yet the majority rose together, and smaller numbers came up between the main risings, so that there was no period of more than six minutes when some were not visible. When the main rising occurred the hole was almost filled and they were so thick that occasionally one would be pushed high in the air with its tail up and body two thirds out of the water and held that way for a second before disappearing again. At no time were there less than five natives shooting, and sometimes as many as twenty. Probably not

more than one in five of those killed were secured, as many mortally wounded went off under the ice, and all those not instantly killed immediately sank. A bullet placed just back of the base of the skull, dislocating or breaking the spinal column, gave the best results, and nearly all killed in that way floated. Nearly every one of those still alive had at least one bullet-hole in it and I saw one that had eight.

"At the time I visited them the greater part were the dark colored or younger individuals, although those first on the scene said that the dark and light colored ones were about equally represented. Every one in shooting would pick a large white one as long as they lasted. The colors represented all the shades of slate and hair brown, gradually fading into pure white. The majority of the adult females were pregnant, the fœtuses measuring from 1450 to 1700 mm. in length. The fœtuses were uniform dark slate color with lighter rings around the eyes. Three calves, about eight feet in length, following their mothers, were darker than the fœtal ones and mottled with chocolate brown. These had not yet cut their teeth. From this size up the color gradually became lighter, some being light slate, others smoke gray and hair brown, until on those from 11 feet 9 inches to 12 feet the color entirely disappeared, leaving them milk or ivory white, except a dark purplish brown stripe about an inch wide on the posterior edge of the fluke, on the dorsal and ventral edge of the 'small' or just anterior to the fluke, on the free edge of flippers, and a sooty ring around the eyes. In still older ones the sooty ring around the eyes was wanting, and the dark markings on fluke, small, and flippers was more subdued. Some of the large white ones had a distinct chlorine green tinge. The fœtuses are lighter than the calves and darker than the medium-sized ones; after birth they assume a darker color and become mottled with chocolate; then they soon begin to fade until the color has entirely disappeared, except as previously stated, leaving them pure glossy ivory or milk-white. When the larger dark colored individuals are examined closely they present a uniform hair brown color punctated with small darker ovoid spots. A transverse sec-

tion through the skin of one of these shows the dermis pure white and the base of the epidermis black, gradually fading towards the surface. Small black pigment lines run from this black base to the surface, giving it the spotted appearance. On the white ones the epidermis is entirely white with no black at the base nor pigment lines running through it.

"In an adult white specimen the epidermis was 9, dermis 4, and blubber 53 mm. thick, and in a large hair-brown specimen the epidermis was 9, dermis 7.4, and blubber 43 mm. thick. The blubber is clean and vinaceous cinnamon in color. The eyeball of an adult male was 30.5 and the iris 16.8 mm. in diameter; iris hazel brown. In no specimen did the bulge of the forehead extend beyond the lips.

"The teeth, which are irregular and peglike in form, are loosely set with wide spaces between them in the rubber-like gum. The normal formula is $\frac{10-10}{9-9}$, but this is seldom found, owing to loss or suppression. In one large male it was $\frac{10-10}{8-9}$; those above all inclined forward, and the first four on each side below inclined forward and the others backward. The two posterior teeth were curved and horn-shaped, and lay forward flat on the gums. The first four on either side below were worn down until they resembled short posts; the second four above had half of the crown worn away, leaving them tusk-shaped. In younger specimens the teeth are more regular.

"The internal ear cavity of nearly every specimen examined contained small, filiform worms, about 19 mm. long and .25 mm. in diameter. In some the cavity, which is quite large, was almost entirely filled with them.

"I again visited the place on May 7 and counted 164 carcasses on the ice, and Mr. Hobson, whose whaling camp found the school, told me that his natives had thrown 70 more back into the hole. About 20 were still alive in it, but these were killed later, and 20 dead ones were in the water frozen in by the ice. Nearly 300 of the school were thus accounted for, and estimating that only one in three was secured after being killed, although I think that one in five wounded would be nearer the truth, it is seen that it originally contained not less than 900 individuals, not one of which escaped."—N. G. B.

MEASUREMENTS OF *Delphinapterus leucas*, TAKEN[1] AT POINT BARROW, ALASKA, MAY 2–7, 1898.

No.	Sex.	Length.	Girth behind Flippers.	Length of Right Flipper.	Width of Right Flipper.	Length of Gape.	Girth of Head at Spout-hole.	Spout-hole to Front of Mouth.	Width of Spout-hole.	Width of Flukes.	Length of Flukes.	Girth of Small.	Diameter of Eye.	Base of Flippers to end of Nose.	End of Fluke to Mammæ.	Distance between Mammæ.
1	♂	4473	2402	508	485	280	1296	585	76	991	508	502	25	940	—	—
2	♀	3965	2211	494	280	241	1207	457	76	813	432	483	25	782	1067	915
3	♀	4194	2465	457	369	267	1245	546	76	940	483	496	25	864	118	928
4	♂	4956	2656	559	330	305	1423	610	76	1080	572	534	25	953	—	—
5	♂	4982	2796	534	457	343	1500	661	76	1093	610	559	31	966	—	—
6	♂	4778	2618	547	483	305	1398	610	76	1042	521	521	25	953	—	—
7	♂	4905	2821	559	457	318	1525	623	79	1118	585	572	25	966	—	—
8	♀	3914	2135	330	312	229	2169	445	76	826	432	457	25	637	991	—
9	♀	4092	2370	429	330	260	1220	546	76	330	445	483	25	839	1106	—
10[2]	♂	4804	2643	584	508	343	—	572	76	330	—	635	—	—	—	—
11[2]	♀	4041	2313	369	318	241	—	470	76	292	457	470	—	—	—	—

[1] By Mr. Buxton, in feet and inches, and here reduced to millimeters.—J. A. A.

[2] To angle of flukes; in all other cases, to end of flukes.

Nos. 2, 3, 8 and 9 were pregnant females; their fœtuses measured, respectively, 1601, 1716, 1550, 1589 mm.

Mr. Buxton's notes contain references to several other species of Cetacea observed by him, but no specimens were collected. These include the Killer (probably *Orca rectipinna* Cope), of which one was seen at Ayan, August 3, 1900, and two others in the bay at Okhotsk, September 18, 1901. Porpoises were seen off the coast of Korea in May, 1900, and at Okhotsk in September, 1901. Also Humpbacks and Finbacks off the coast of Saghalin Island in September, 1901, where many are taken by the Kaiserling Company "for their oil and flesh, which is sold principally to the Japanese for food."

Respecting the 'Right' Whale, probably *Balæna sieboldii* Gray, he says: "Saw two Right Whales between Ayan and Okhotsk on August 4, 1900"; and adds:

"The hunting of this species was formerly prosecuted with great energy by the Americans in Okhotsk Sea and adjacent waters, but is now almost totally abandoned, only one or two filibustering schooners visiting these waters each year. One American schooner visited Penginski and Gichiginski Gulfs in the spring of 1900 and secured several whales. The same one returned in April and May, 1901, but got none. I saw some 'three-foot' bone in a Koryak yomta at Shestacova on Penginski Gulf. An occasional one is seen off the mouth of Gichiga River by the people living there and the coast Koryaks now sometimes catch one along the Taiganose Peninsula. Slabs of bone sawed from the whale's lower jawbone are used by the Russians and natives to shoe their sledges with late in the spring."

2. **Rangifer tarandus** (*Linn.*).

REINDEER.

Reindeer are represented by specimens of both wild and domesticated animals, from several quite widely separated localities, including two races of the domesticated Reindeer. These specimens were collected partly by Mr. Buxton and partly by Mr. Bogoras, as follows: A series of 5 specimens, skins and skulls, collected for mounting by Mr. Buxton,

Nov. 6, 1900, from a large herd about 50 miles east of Gichiga, on the Taiganose Peninsula, consisting of a large 7-year-old male, a younger adult male, a yearling male, a 4-year-old female, and a 2-year-old female; also two fawns three days old, taken April 30, and 2 fawns four weeks old, taken June 14; also two flat skins, to show the variations of color, and a skin of a female taken by Mr. Axelrod at Marcova, Nov. 15, 1900. These all belong to the Lamut race of Reindeer.

Mr. Buxton also obtained the skins, without skulls or measurements, of two wild Reindeer at Marcova, a female and a young male, killed and brought in by hunters.

Mr. Bogoras's series includes 4 skins and skulls of wild Reindeer collected at Mariinski Post, mouth of the Anadyr, at different dates, and several additional skulls; also 6 young fawns of different ages and two skins and skulls of females of the Chukchee domesticated race, and one skin and skull of a female of the Lamut domesticated race.

Although this material seems considerable it is insufficient, both in quantity and character, to enable one to make satisfactory comparisons between the wild and domesticated animals, or between the two commonly recognized domestic races, the Lamut and Chukchee. Also material is lacking in sufficient quantity to give much new information in respect to the supposed differences between the Reindeer of Siberia and of Scandinavia. Most of the adult males were killed when the antlers were in the velvet, and the pelage had not acquired its full winter development. The color of these skins is much like that of our Eastern Woodland Caribou, at least in general effect; the antlers, however, are longer and slenderer, and partake more of the Greenland type.

Mr. Buxton's measurements of the Taiganose Peninsula specimens are as follows:

No. 18179, a 7-year-old male, is unfortunately without measurements. No. 18180, an adult male: "Length, 1750 mm.; tail, 125; hind foot, 510; girth, 1190; height, 970. A fine, large individual."

No. 18178, a 4-year-old female: "Length, 1630 mm.; tail, 125; hind foot, 480; height at shoulders, 940; girth behind fore legs, 1030; girth of neck, 530; head of humerus to head of femur, 860. A perfect

specimen of a 4-year-old female of average color and size and with perfect, average-sized antlers, selected from a herd of more than 2000 which varied in color from pure white to a dark seal brown."

No. 18182, young female, "A fine average individual. Length, 1405 mm.; tail, 120; hind foot, 450; height, 785; girth, 910."

No. 18181, yearling male. "A very fine specimen, of average size and color, in good pelage, and with as good antlers as it was possible to find in a herd of more than 2000. Length, 1375 mm.; tail, 119; hind foot, 440; height at shoulders, 760; girth, 860."

A detailed report on this material is necessarily deferred till a later occasion, when a more general study of both the Old World and American forms of *Rangifer* can be undertaken.

The following notes by Mr. Buxton supply much interesting information:

"Wild Reindeer. Russian name, *Déeka Ō-láin*, meaning wild reindeer. Undomesticated reindeer are still quite common in the country about Marcova. Every few weeks during the winter travellers in that territory report seeing small herds of them and a few are killed and brought to Marcova every winter. There are some in the Gichiga territory. The specimens in the collection were taken in February, 1901, near Marcova. The skin of the wild reindeer is much thinner than that of the domesticated form and the hair is much lighter in texture. They are smaller also than the domesticated ones.

"Domesticated Reindeer. Russian name, *Ō-láin*. Representatives of nearly all the different tribes of native people inhabiting that vast section of northern Eurasia lying between the Arctic Ocean on the west and Bering Sea on the east have from the remotest times maintained herds of reindeer. As these animals are so constituted by nature than they can be utilized for food, clothing and transportation, they form a very important factor in the existence of these high north people. The Chukchees who inhabit the extreme northeastern corner of Siberia, between the Arctic Ocean and Bering Sea, possess the largest herds of any of the Siberian natives, some of them containing as many as 20,000. The Koryaks living to the south of those along Bering Sea and around the head of Okhotsk Sea also have large herds, and the Tunguses,

further inland and along the shore of Okhotsk Sea, also possess considerable numbers of them, The Lamuts, along the lower Kolyma, are also reindeer people.

"The Lamut are the largest of all the domesticated deer in Northeastern Siberia, and the Tungus are larger than those of the Chukchees or the Koryaks. This difference in size is probably accounted for by the fact that the Chukchees and Koryaks inhabit a treeless country, while the Tunguses and Lamuts live in the timbered section further inland. I had the opportunity of observing but one large herd, which was kept on the Taiganose Peninsula, and contained four or five thousand. In the latter part of November I visited it in order to obtain some for food and specimens. At that time they were in full, unworn pelage. The older ones had shed the velvet from their horns, but the young ones still retained it. In color they ranged from pure white to dark seal brown, although the general color of the adults is a brownish gray. The younger ones are darker. The antlers are generally smaller and more terete than those of the North American Barren Ground Caribou, while the animal itself is larger. During the latter part of January the oldest animals begin to shed their antlers, but all do not complete the process before the latter part of May. The young are dropped from the middle of April to the first of June. In May they begin to change pelage and complete it in August and the early part of September. The antlers are full grown from August to October.

"This herd was owned by one Koryak, the head man among the Koryaks in that region, who kept twelve men and their families to look after the deer. The camp, consisting of three very large deerskin tents, is moved quite often in order to afford them good feed. One or two men are in constant attendance day and night, summer and winter. Many of the reindeer are broken to ride and drive; and nearly two hundred sledges are used in moving the camp. The animals are very tame and are easily caught with the long sealskin lariats, which the men handle very dexterously.

"Reindeer in Siberia generally give birth to young when

they are two years old, and it is exceptional for them to have young when one year old; but those that have been imported to Alaska foal at one year old, and it is exceptional for them to go until they are two. Also in Alaska a large percent has twins.

"They are inferior to dogs for travelling, being able to make only about one half the distance of a dog team in a day, and they are unable to endure the continuous work of dogs." —N. G. B.

3. **Paralces alces** (*Linn.*).

ELK.

The Elk has apparently disappeared from the region bordering the Okhotsk Sea, but still exists further inland. No specimens are included in the collection.

"Russian name, *Lōs*. The Russians at Gichiga say that Elk were formerly found at Parane on the head of Penginski Gulf, and that a few are still taken near Yamsk. Mr. Jochelson says that they are abundant in the valley of the Kolyma River."—N. G. B.

4. **Moschus moschiferus** *Linn.*

MUSK DEER.

The collection contains a single specimen of Musk Deer, a young male, collected by Mr. Jochelson in the Verkhoyansk Mountains, near the junction of the Yana and Dulgulach Rivers, Yakutsk, Siberia. The general color above is blackish brown, strongly varied with yellowish gray; ears blackish, fringed internally with white; throat and breast dusky strongly varied with white. The collector's measurements are: Head and body, 780 mm.; tail, 30; hind leg, 468; girth, 490.

It is hardly probable that the north Siberian form, represented by the present specimen, can be subspecifically the same as true *moschiferus* of the Himalayas, but lack of material prevents a critical consideration of the subject. Pallas's name *Moschus sibiricus* is apparently available for the northern form, should it prove separable.

LIBRARY OF THE UNIVERSITY

5. **Ovis nivicola** *Eschscholtz.*

KAMCHATKA BIGHORN.

Represented by 3 skins with skulls, and one skin with skeleton, collected by Mr. Buxton on Taiganose Peninsula, April 4, 1901, and by one skin and skull and four pelts purchased by Mr. Bogoras at Baronesskorf Gulf.

Mr. Buxton's measurements of three specimens in the flesh are as follows:

No. 18211, ♂. Total length, 1350 mm.; tail, 102; hind foot, 395; height, 840; head of humerus to head of femur, 760; girth, 1000; girth of neck, 510.

No. 18213, ♀. Total length, 1380 mm.; tail, 90; hind foot, 373.

No. 18210, ♂. juv. (quite young). Total length, 1070; tail, 86; hind foot, 325; height, 665; head of humerus to head of femur, 665; girth, 690; girth of neck, 330.

The skull of No. 18211, adult male, measures: Basal length, 223 mm.; least interorbital breadth, 111; greatest orbital breadth, 156; mastoid breadth, 95; length of nasals, 68; breadth of nasals at middle, 38.5; palatal length, 131; length of upper toothrow, 72; length of horns along outer edge, following the curvature, 588; spread at tips, 470; circumference at base, 255.

The skull of No. 18212, an older and much larger male from Baronesskorf Gulf, measures: Basal length, 252 mm.; least interorbital breadth, 125; greatest orbital breadth, 168; mastoid breadth, 95; length of nasals, 83; breadth of nasals at middle, 43; palatal length, 137; length of upper toothrow, 65; length of horns along outer edge, following the curvature, 730; spread at tips, 453; circumference at base, 295.

The skull of the adult female, No. 18213, measures: Basal length, 240 mm.; least interorbital breadth, 104; greatest orbital breadth, 144; mastoid breadth, 80; length of nasals, 78; breadth of nasals at middle, 26; palatal length, 129; length of upper toothrow, 70; length of horns along curvature, 167; spread at tips, 116.

As the description and figure of this sheep given in 'Wild Oxen, Sheep, and Goats of All Lands' (pp. 221–226, pl. xviiiA) are quite misleading as to the color of the animal the following description, based on a good series of specimens, is here presented. Eschscholtz's figure is also incorrect as to color and does not agree well with the same author's good description.

Male, winter pelage.—General color yellowish gray brown, lighter on the flanks and over the middle region of the body, darker on the shoulders, top of neck, and hinder part of back. Ears short, heavily clothed, brown like the surrounding parts except the apical fourth which is whitish. Forehead and face yellowish white, with a broad zone of brown across the nose, but end and sides of nose whitish; chin, throat, breast, and most of ventral surface dark brown; inguinal region, inside of thighs, and buttocks clear white, the caudal disk divided by a dark band from the back continuous with the dark brown tail, which is darker than the general tone of the back. Fore and hind limbs dark ruddy brown, with a narrow band of dull white on the posterior surface. Horns yellowish brown, or brownish wax-yellow.

The four pelts, in full winter pelage, vary little in coloration except that some are a little darker or a little lighter than others. The four April skins, complete, with leg bones and feet, have the coat somewhat worn and are a little lighter from bleaching. Otherwise the two adult males are as above described; an adult female is lighter colored throughout than the males, and a yearling male lamb is still lighter than the female, the general coloration being light brownish with a yellowish cast, the front of the legs darker. The tips of the hairs are whitish with the under pelage brownish, showing slightly through the surface.

In none of the 7 adult skins, all in winter pelage, is there any indication of a white winter coat, which Dr. Lydekker appears (*l. c.*) to have unjustifiably assumed, in view of what other observers have stated, may characterize the Kamchatka Bighorn. In all of the four skins that have the head skin complete, the nose and face are white, but the brown area across the upper part of the nose varies in extent, being very broad in one, much narrower in another, and practically absent in a third.

In color, size, slenderness, and curvature, the horns closely resemble those of the *Ovis dalli-stonei* group, but the general coloration of the animal is much different from either, closely resembling that of typical *O. canadensis*.

It is surprising, however, in view of the material now available for comparison, that the Kamchatka Bighorn should have ever been considered specifically identical with the

American forms, although these are, of course, its nearest affines.

"Russian name, *Dee-ke Bar-an*, meaning wild sheep. Mountain Sheep probably occur all over Northeastern Siberia wherever the mountains are rugged enough to attract them, although I have only a few reliable records of their presence at widely separated places in that vast territory. They are found in the Stanovoi Mountains, at Ayan, Okhotsk, Ola, Yamsk, Mickina or Niakinsk, and on as far north at least as the Arctic Circle, and perhaps further, although the range becomes much less rugged towards the north. They are also found along the Kolyma River to the westward of that range. A few are taken in the mountains in the Anadyr Territory about Marcova. They are common on the Taiganose Peninsula, and are said to be abundant all over Kamchatka from Petropavlovsk northward. Kamchatka, from the nature of its mountains and vegetation, offers the most suitable place for them. The wandering reindeer Koryaks inhabiting the Taiganose Peninsula kill a few every winter. Three of those in the collection are from that locality, while the fourth is from Baronesskorf Gulf." — N. G. B.

6. **Sciuropterus russicus** (*Tiedemann*).

SIBERIAN FLYING SQUIRREL.

Mus volans LINNÆUS, Syst. Nat. ed. 10, I, 1758, 64 (in part; based primarily on *Sciurus volans* Seba, exclusively American).

Sciurus volans LINNÆUS, Syst. Nat. ed. 12, I, 1766, 88 (in part).

"*Pteromys russicus* TIEDEMANN, Zool. I, 1808, 451."

Pteromys sibiricus DESMAREST, Mamm. II, 1822, 342 (= *Sciurus volans* Pallas, non Linnæus).

This species is represented by four hunters' skins, without skulls or feet, obtained by Mr. Buxton at Marcova, obviously winter skins. Three of them have the upper parts nearly uniform pale whitish gray, while the fourth has a barely perceptible tinge of pale buff; the lower parts are white with a very faint buffy tinge, and a slight mixture of black-tipped hairs overtopping the general pelage. The tail is grayish

white above, strongly varied with long black-tipped hairs, and with a tinge of buffy brown; below similar but more strongly washed with buffy brown. Eyelids black; a broad superciliary stripe and cheeks white; an indistinct blackish lateral line of short hair along the sides of the neck; fore feet (present in only one specimen) gray blotched with blackish; hind feet above gray like the back, and pale buffy white below.

Fourteen specimens in alcohol, collected by Mr. W. Jochelson at Verkhne Kolimsk, on the Kolyma River, in December, 1901, are similar in coloration, except that some of the specimens are more tinged with buffy, especially on the tail and feet. These specimens afford the following measurements:

MEASUREMENTS OF *Sciuropterus russicus*.

Mus. No.	Locality.	Date.	Sex.	Total Length.	Head and Body.	Tail Vertebræ.	Hind Foot.
19522	Verkhne Kolimsk, Kolyma River	Dec. 1901	♂	247	150	97	38
19526	" " " "	"	♂	270	170	100	34
19528	" " " "	"	♂	275	175	100	35
19529	" " " "	"	♂	273	170	103	35
19531	" " " "	"	♂	259	174	85	36
19532	" " " "	"	♂	280	174	106	36
19521	" " " "	"	♀	271	170	101	37
19523	" " " "	"	♀	268	168	100	36
19524	" " " "	"	♀	281	175	106	37
19525	" " " "	"	♀	253	150	103	35
19527	" " " "	"	♀	274	172	102	33
19530	" " " "	"	♀	279	173	106	33
19533	" " " "	"	♀	283	170	113	35
19534	" " " "	"	♀	285	173	112	37
	Average, 6 males and 8 females	—	—	272	169	104	35.5

An adult male skull has a total length of 42 mm. and a zygomatic breadth of 25 mm.

Without other material it is impossible to compare the present series with the Flying Squirrel of northern Europe, commonly known as *Sciuropterus volans* (Linn.). As, however, the *Mus volans* Linn. 1758 (and earlier in Syst. Nat. and Faun. Suecica) was based primarily on the *Sciurus volans* of Seba and other references to the American animal, the name

volans has of late been properly restricted by American writers to the Virginia form of the group. The first name available for the northern Europeo-Asiatic animal is apparently *Pteromys russicus* of Tiedemann. (I have not Tiedemann's work at hand, but find this name repeatedly cited for the north European animal.)

"Russian local name, *Lee-tyá-gah.* Flying Squirrels are common in the wooded section inland from Ayan, Okhotsk, and Ola, and all over the wooded section westward from Gichiga and in the Kolyma River district. A very few are still found near Yamsk and along the immediate headwaters of the Gichiga River. No. 472 and 486 (pelts) were taken at Yeropole, 100 miles northeast of Marcova, where there is pine timber. Mr. Jochelson says that they are abundant along the Kolyma River as far north as timber line." — N. G. B.

7. **Sciurus vulgaris calotus** (*Hodgson*).

SIBERIAN SQUIRREL.

Mustela ? calotus HODGSON, Calcutta Journ. Nat. Hist. 1841, 221–223, pl. ix. Himalaya and Thibet. Type from Thibet, *apud* Gray, Ann. and Mag. Nat. Hist. (3) XX, Oct. 1867, 272.

Sciurus calotus GRAY, Ann. and Mag. Nat. Hist. (3) XX, Oct. 1867, 272. "Hab. North China, Thibet (Mr. Hodgson's type), Siberia, B. M."

Sciurus vulgaris calotus BARRETT-HAMILTON, P. Z. S. 1899, 6. "Hab. Eastern Siberia, the exact limits uncertain; . . ."

? *Sciurus vulgaris argenteus* KERR, Ann. King. 1792, 256. River Obi. (*Cf.* Barrett-Hamilton, *l. c.*, p. 6.)

Ten specimens, collected by Mr. Buxton in February, 1901, "on the Yeropole River, 100 miles northeast from Marcova," are in full winter pelage, with black ear-tufts, black tails, and blackish brown feet. These specimens agree quite well with Mr. Hodgson's description (*l. c.*), from imperfect skins, of his "*Mustela ? calotus*," which, he says, is "clear slaty blue freckled vaguely with hoary; the amply tufted ears, the spreading tail, and the limbs blackish"; "and the middle of the belly and the neck in the same line, together with the insides of the limbs close to the belly are pure white."

These specimens are exceedingly uniform in color, the upper parts being dark gray, with a barely perceptible wash of brownish over the median area from the middle of the back posteriorly. The soles of the feet are clothed with very long, thick, closely matted woolly fur, of a grayish brown color.

Measurements.—Ten specimens (6 males and 4 females) measure as follows: Total length, 395 (372–420) mm.: tail vertebræ, 171.4 (154–192); hind foot, 63.6 (57–69). An average adult skull has a total length of 52 and a zygomatic breadth of 31 mm.

In addition to the above described series of ten specimens from Marcova, Mr. Buxton obtained at Gichiga and at Marcova, a series of 20 hunters' skins to illustrate the color variation to which this species is subject. The exact locality of these specimens is unknown, but they must have come from the general region tributary in trade relations to these points. These are complete skins except that they generally lack the feet. There are also 6 hunters' skins obtained by Mr. Bogoras at Marcova, which lack tail and feet. These six agree in coloration with the above-described Marcova skins collected and made up as specimens by Mr. Buxton.

The Buxton series of 20 hunters' skins is deserving of special mention on account of the wide color variations they present. Eleven of them are like the 16 dark gray specimens already enumerated and call for no special remark. Of the other 9, three are albinistic, — pure white below as in normal specimens, with the rest of the pelage dull light creamy brown, with the tail and ear-tufts somewhat darker than the general coloration. The remaining six have the general coloration of the body (the median ventral surface excepted) light ashy gray, many shades lighter than the dark gray series; three of them have the tail and ear-tufts bright red. They thus agree with the winter pelage of *Sciurus vulgaris varius* (Kerr), of Scandinavia and eastward to northern and central European Russia, as defined by Barrett-Hamilton (*l. c.*, p. 6). The other three have dusky brown ear-tufts with a faint reddish tone, and dusky reddish brown tails, with more or less reddish on the crown and at the base of the ears,

and a reddish brown shade over the lower back. They are thus more or less intermediate between the three last described and the ordinary dark gray phase, as regards the ear-tufts and tail, but more reddish on the lower back and head. It might be inferred that the six light gray specimens with more or less reddish ear-tufts and tails came from some point far to the westward, and thus represent the north European form, were it not that Mr. Bogoras assures me that all of these phases of coloration occur in the region immediately about Marcova. The albinistic phase and the specimens with red ear-tufts and red tails, he informs me, are very rare, and are looked upon by the hunters as 'curiosities.'

"Russian name, *Bél-kah*. Although an enormous number of pelts of this handsome little mammal are annually brought to the settlements along the Okhotsk Sea and to Marcova very few are now found in the vicinity of any of these places. Inland, in that vast section of Northeastern Siberia which is covered with coniferous trees, they are still abundant and their skins are the chief source of revenue to the natives inhabiting that territory. A few are still found near the western shore of Okhotsk Sea, along the upper Gichiga and Pengina Rivers and along the tributaries of the Anadyr system. From two to five thousand are yearly brought to Marcova; from seventy-five to one hundred thousand to Gichiga; from one hundred to one hundred and twenty-five thousand to Okhotsk, and about five thousand to Ayan and Ola. Formerly many more than this were brought out at Ayan, the receipts having dropped off four fifths in the past twenty years. They are killed principally by the Tunguses during the winter with old-fashioned small-bore flint-lock rifles. The skins are removed, turned inside out, dried and tied up in bundles of ten, in which shape they are brought to the coast during the summer — July — and traded to the merchants or at the government magazines for powder, lead, iron, tea, and rye flour. The price varies from eighteen to twenty kopechs each, although the government allows them but fifteen. Nearly all of them are used in Russia for lining fur garments." — N. G. B.

8. **Eutamias asiaticus** (Gmelin).

Pallas Ground Squirrel.

Sciurus striatus Schreber, A. Das asiatische, Säug. IV, 1785, 790.

Sciurus striatus, α. asiaticus Gmelin, Syst. Nat. I, 1788, 150. Based on *Sciurus striatus* Pallas, Nov. Spec. Quad. Glir. Ord. 1778, pp. 378–384, ex Siberia.

Type of present description, No. 18474, ♂ ad., Gichiga, Northeast Siberia, August 12, 1900; N. G. Buxton, Jesup North Pacific Expedition.

Post-breeding Pelage.— Front half of dorsal surface, from nape posteriorily, and sides of shoulders, light gray faintly tinged with yellowish; rest of dorsal surface, including top of head, rump and thighs, yellowish brown; five black dorsal stripes, the median one extending from crown to base of tail, the inner pair from sides of nape to rump, the outer pair from shoulder to hip, all equally distinct and about equal in width; the four light dorsal stripes are whitish gray anteriorly and yellowish rufous posteriorly, the outer pair less strongly yellowish than the inner pair; supraocular stripe, from nose to posterior border of eye, pale buffy white, from eye to ear rusty brown; subocular stripe, from front border of eye to posterior base of ear, pale buffy white, confluent with the small white postauricular patch; below this a broad maxillary streak, rusty brown mixed with black-tipped hairs; fore and hind feet pale dingy buffy gray; whole ventral surface with a barely appreciable tinge of buff; ears like the top of the head, with narrow whitish tip and edging; tail with the hairs broadly tipped with white, giving a general whitish gray effect, the hairs individually being pale rufous at base, forming, when seen from below, a broad central area of pale yellowish rufous, about one third the total width of the tail; this area is bordered with a band of black, and a broad outer edging of white.

Measurements.— Type, total length, 259 mm.; tail vertebræ, 113; hind foot, 37. Four adult males and eight adult females measure as follows: Males, total length, 258 (250–265); tail vertebræ, 118 (112–129); hind foot, 38.5 (37–40). Females, total length, 261 (253–280); tail vertebræ, 116 (108–120); hind foot, 37.5 (35–39).

Skull.— Type, total length, 37 mm.; zygomatic breadth, 21; length of nasals, 13; posterior breadth of nasals, 3.4.

This species is represented by 12 specimens collected at Gichiga, 11 of which were taken July 6–10, 1901, and one September 27, 1900; and one from Ola, about sixty miles south of Gichiga, taken September 12, 1900; also one from Marcova, without date. A single specimen from Saghalin

Island, collected by Dr. Berthold Laufer, in August, 1898, is not appreciably different from the Gichiga series. This series of 15 specimens is quite uniform in coloration, varying only in the color of the lower back, which is a little deeper fulvous in some of the specimens than in the type. The series differs strikingly, through very much paler coloration, from a series of 10 specimens in the U. S. National Museum from the upper Amoor River, representing Bonhote's *Tamias orientalis* (Ann. and Mag. Nat. Hist. (7), IV, Nov. 1899, p. 385). It has only a remote relationship, as would be expected, with *Eutamias senescens* Miller (Proc. Acad. Nat. Sci. Phila. 1898, p. 349), from Pekin, China, the type of which is before me.

With proper material for comparison, the Siberian *Eutamias* proves to be not closely related to the most northern form of the genus in North America, namely, *E. quadrivittatus borealis*, of which I have for comparison a series of nearly 100 specimens collected at various points in northern British Columbia. The American form is fully one half less in size (as regards bulk of body), and very much darker and otherwise strikingly different in coloration.

Sciurus striatus Pallas (Nov. Spec. Quad. Glir. Ord. 1778, pp. 378–384), which later became the basis of Gmelin's *Sciurus striatus*, *α. asiaticus* (Syst. Nat. I, 1788, p. 150), included all the then known striped Ground Squirrels of Europe, Asia, and America. His description was based on a Siberian specimen, but, as usual, he failed to state the locality whence his material came. He speaks of the Siberian form as frequenting all of the wooded parts of Siberia, from the Kama and Dvina Rivers eastward to Kamchatka. His description indicates an animal with five black dorsal stripes, and with the general coloration above pale lutescent. As he fails to mention the conspicuous reddish color of the head and lower back which especially distinguishes the Amoor River form (*Tamias orientalis* Bonhote), and as his description satisfactorily characterizes the animal of the Gichiga region, there seems to be no alternative but to restrict the name *asiaticus* to the Gichiga animal.

Schreber, with his usual astuteness, properly discriminated the Asiatic animal as different from the American, as "A. Das asiatische," but failed to give it a technical name, which was first supplied later by Gmelin, as above cited.

"Russian name, *Bŭr-ŭn-dóok*. Abundant at Ayan, Okhotsk, and Ola, common at Gichiga and Pengina, and present at Marcova. At Gichiga they are confined to the upper stretches of the rivers where the larch (*Larus sibirica*) grows, and to the patches of recumbent stone-pine (*Cembra pumila*) along the seacoast. I spent the second week in July, just at the height of the mosquito season, encamped at the junction of the Gichiga and Chooma rivers. The country between these streams is a park-like expanse of dry, level country, covered with an open growth of Siberian larch, and with tangled masses of willows close to the river-banks. Under the trees is a thick growth of grass and flowers. I am certain that the chipmunks were very common, although I secured only ten, nine males and one female, during five days of almost continuous tramping through these woods, and heard but two more. Eight of the ten were feeding on the green cones in the tops of the larch trees, where they would remain motionless and allow me to approach to the foot of the trees. The other two were startled from the grass and immediately ran up trees. Most of the females taken had been nursing young. They retire to their winter quarters the last week in October and do not come out again until the first week of the following June. At Ayan I saw several of them during the first week of August feeding on the green cones of *Larus ayensis*, which there crowd the little valley quite down to the beach. Mr. Sokolnikoff says that they occur along the Yeropole and Main rivers, tributaries of the Anadyr, northeast of Marcova. Several of the chipmunks killed at Christova had their cheek pouches filled with the green seeds of the larch and larvæ of a large ant abundant there in the woods." — N. G. B.

9. Citellus[1] buxtoni, sp. nov.

EAST SIBERIAN SPERMOPHILE.

Type, No. 18403, ♂ ad., Gichiga, west coast of Okhotsk Sea, Siberia, August 19, 1901; N. G. Buxton, Jesup North Pacific Expedition.

[1] *Cf.* Allen, this Bulletin, XVI, 1902, p. 375.

Post-breeding pelage. Type.— Front and top of head deep rufous, varied minutely on the crown with black-tipped hairs; rest of the dorsal area yellowish brown, thickly covered with small squarish spots of white, narrowly edged posteriorly with black; sides and ventral surface ochraceous, wholly concealing the plumbeous underfur; back and sides with many long, stiff, wholly black hairs; front and sides of the nose, chin, and upper throat deep buff; upper surface of both fore and hind feet rusty buff; upper surface of tail blackish, especially towards the tip, conspicuously fringed with deep fulvous, the hairs individually being grayish fulvous, then narrowly ringed with black, then with a broader ring of deep fulvous, followed by a broad band of black and a broad fulvous tip; lower surface of tail deep orange rufous, with a subapical black band, reaching nearly to the base of the hairs, and edged and tipped with fulvous.

In breeding dress (left-over winter coat) the pelage is thin and worn, and the general coloration is much paler, through fading and wear, so that in many specimens the sides of the neck and shoulders are gray, almost without trace of fulvous; the sides are pale fulvous gray, the deep orange or ochraceous tint of the ventral surface is much paler, and the fulvous fringe of the tail has bleached to yellowish white.

Young of the year, one eighth to one half or two thirds grown, resemble in a general way the faded breeding adults, but the pelage is softer and more woolly, and the markings and tints are less developed; the crown patch is paler and mixed more or less with gray, the scapular region is pale, and the dorsal region grayish brown varied with black, with the spotting poorly defined.

Ten adult males and ten adult females measure as follows: *Males*, total length, 356.8 (340–380) mm.; tail vertebræ, 90.9 (80–104); hind foot 59.2(57–62); *Females*, total length, 358.7 (345–374); tail vertebræ, 90.3 (80–101); hind foot, 58.5 (56–60).

This species is represented by 48 skins and skulls, 3 specimens in alcohol, and 10 additional skulls, taken at Gichiga by Mr. Buxton at various dates from May 21 to October 5, and 7 specimens obtained at Indian Point (Chaplin Point of most maps), by Mr. Bogoras, in June, including two pure white albinos, purchased of the natives.

In post-breeding pelage the coloration varies considerably in different specimens. The description given above of the type indicates about the average condition, from which the coloration varies chiefly in the depth of the ochraceous color of the sides and ventral surface, which ranges in different specimens from orange to pale ochraceous, with a corresponding variation in the amount of fulvous suffusing the dorsal

area and the border of the tail. The amount of fading shown by May, June, and early July specimens, which still retain the left-over winter pelage, also varies, some specimens having the shoulders and sides of the neck whitish gray, with scarcely a trace of fulvous, while in others a distinctly fulvous tone infuses the gray.

Citellus buxtoni finds its nearest relative in *Citellus barrowensis* (Merriam) from Point Barrow, Alaska, from which, however, it differs in smaller size and relatively as well as absolutely shorter tail, the average measurements of 7 adults from Point Barrow, collected on the McIlhenny Expedition, being as follows: Total length, 421 (382–470); tail vertebræ, 145 (130–178); hind foot, 60.4 (57–65). The general style of coloration is the same, but the Point Barrow animal has the dorsal area a darker brown, and the fulvous suffusion of the sides and underparts is very much paler. The difference in size is especially striking on comparison of the skulls, an average adult skull of *barrowensis* giving a total length of 61 mm. as against 58 in *buxtoni*, while the dentition in the former is much heavier, the length of the upper toothrow being 15 mm. as against 12 in *buxtoni*. Among other cranial differences may be noted the form of the posterior narial opening, which is not only narrower in *buxtoni*, but the pterygoid processes curve more strongly inward.

The other American forms of the *parryi*[1] group differ, as

[1] In adopting, some years since, the name *empetra* (*Mus empetra* Pallas) for the group of Parry Spermophiles (see N. Am. Rodentia, 1877, pp. 842–844, and Bull. Am. Mus. Nat. Hist., X, 1898, p. 454) I was influenced largely by Schreber's plate of *Arctomys empetra* (Säuget., pl. ccx), which Schreber says (*op. cit.*, IV, 1785, p. 744) was transmitted to him by Pallas. This plate clearly does not represent any known species of *Arctomys*, while it does fairly well represent the large rufous-headed spermophile of northern North America, later known as *Spermophilus parryi*. Pallas's brief description, paraphrased by Schreber, is unsatisfactory, corresponding better perhaps with a half-grown specimen of the northern form of the common woodchuck (*Arctomys monax* auct.) than with the Parry Spermophile, the top of the head and feet being described as brownish black instead of rufous; but the ventral surface is said to be "rufo-ferruginea," and the size is given as between that of a marmot and the small spotted spermophile of Europe (*Mus citellus* Linn.).

Pallas cites (Nov. Spec. Quad. Glir. Ord., 1778, p. 75) both Pennant's and Forster's 'Quebec Marmot,' the latter being the Parry Marmot and the former, in all probability, a young woodchuck, so that Pallas's *Mus empetra* was in any case composite. Sabine, in 1822 (Trans. Linn. Soc. London, XIII, 1822, p. 584), used Pallas's name *empetra* for the northern form of the woodchuck, describing under this name specimens received from the Hudson Bay Company. This may be taken as definitely fixing the name *empetra* upon the northern woodchuck, leaving the name *parryi* Richardson as available for the spermophile (*Citellus parryi* ex Richardson), with Lyon Inlet, Melville Peninsula, as its type locality. Thus, in order to clear up a vexatious case of nomenclature (see Osgood, N. Am. Fauna, No. 22, Oct. 1902, p. 47), it seems best to ignore the alleged figure of Pallas's *Mus empetra*, since it was not published by Pallas, and clearly disagrees with his previously published description.

would be expected, still more widely from *buxtoni* than does its nearest geographical neighbor, *barrowensis*.

C. buxtoni has only a remote relationship to *C. eversmannii* (Brandt) from the Altai Mountains, the latter being very much smaller, with relatively longer tail, and very different coloration, wholly lacking the rufous head-patch so characteristic of *C. buxtoni* and the whole *parryi* group.

"Russian local name, *Ōv-ráhs-ka*. Abundant in suitable places at the mouth of the Anadyr River, Marcova, Pengina, Gichiga, Ola, Okhotsk, and Ayan. Mr. Jochelson says that it is also abundant in the Kolyma country, where they are sometimes eaten by the natives when other food is scarce. At Gichiga larger or smaller colonies of them are scattered all along the river banks and along the high bluffs which overlook the sea. On the right bank of the Gichiga River, about five miles above its mouth, is a wide sandy bottom, a few feet above the river, which in the summer is covered with a thick growth of grass and flowers. This bottom for nearly a mile along the river and two hundred yards inland is covered with spermophiles' burrows, and the colony contains three or four hundred individuals. During summer their runways radiate from these burrows in all directions and cross one another in the tall grass. At this time one can see them sitting erect at their holes and running through the grass, and hear them utter their sharp *shick-shick* of alarm. They begin to come out of their winter quarters as soon as the snow begins to leave, about the second week in May, and return during the last week in September. The young are born about the time they emerge from hibernation. Their food consists of green grass and plants and their seeds, which they store, at least in limited quantities." — N. G. B.

10. **Citellus stejnegeri,** sp. nov.

KAMCHATKA SPERMOPHILE.

Spermophilus brunniceps KITTLITZ, Denkwürdigkeiten einr Reise, etc., II, 1858, 337. Nomen nudum. Southern Kamchatka.

Spermophilus parryi BRANDT (nec Richardson), Bull. phys. math. Cl. Acad. Sci. St. Pétersb., II, 1844, 373, part; only the reference to the Kittlitz specimen, as above.

Type, No. 63226, U. S. Nat. Mus., ♂ ? juv., near Petropaulski, southeastern Kamchatka; Dr. L. Stejneger.

Allied to *C. buxtoni* from Gichiga, but very different in coloration, and rather larger, with heavier dentition.

General coloration above gray shaded with blackish, and varied with small squarish white spots; sides gray with a faint tinge of pale fulvous; ventral surface dingy gray; sides of shoulders, fore arms and feet, and the whole pectoral region strong fulvous, palest on the breast and brightest on the fore arm; thighs and hind feet fulvous gray; chin, throat, and sides of the nose pale buffy white; top of the nose as far as the eyes chestnut rufous; top of head from middle of eyes posteriorly blackish tinged with dark rufous; tail above basally mixed blackish and gray, the apical third of the vertebral portion and the tip black, the tips of the hairs pure white, forming a white fringe; tail beneath fulvous gray centrally for the basal two thirds, the central area bordered with black, the apical third all black fringed with white.

Measurements.— There are no measurements, taken from the fresh specimens, available. Approximate measurements from the skin are as follows: Total length, 306 mm.; tail vertebræ, 75; tail to end of hairs, 110; hind foot, 55. Skull, total length, 53 mm.; zygomatic breadth, 31; nasals, 20; upper toothrow, 13.

A second specimen (U. S. Nat. Mus. No. 14136), also from near Petropaulski, and collected by Dr. Stejneger, for whom the species is named, — a flat skin, lacking feet, tail, and skull, — is exactly similar to the one already described, so far as the body is concerned. The type specimen is nearly full grown, as shown by the skull, in which the permanent premolars are just coming into place, their crowns being visible beneath the milk teeth, three of the four milk premolars being still retained.

Compared with *C. buxtoni* of exactly corresponding age, *C. stejnegeri* is characterized by the absence of any fulvous suffusion of the back, and of the strong ochraceous tint of the sides, limbs, and ventral surface. The tail has a very much larger area of black, and is fringed with white instead of fulvous. As regards the skull, the dentition is heavier, and the palatal floor much less curved downward posteriorly, it being in *C. stejnegeri* nearly flat throughout and in *C. buxtoni* strongly arched for the posterior third.

Dr. Stejneger has kindly called my attention to the following passage in Kittlitz's 'Denkwürdigkeiten einr Reise,' etc.

(Vol. II, 1858, p. 337) as possibly furnishing a name for this species. Kittlitz says: "Hier [in the mountains near Ganal] ward zwischen Alpenpflanzen plötzlich eine weibliche Jewraschka gefangen, ein kleines Murmelthier, das dem *Arctomys citillus* nahe steht. Die Art unterscheidet sich von ähnlichen bei Pallas beschriebenen haupträchlich durch die geringere Zahl der Mammellen, deren nur acht sind. Das Exemplar ward in Petersburg unter dem Namen *Spermophilus brunniceps*, Brandt, aufgestellt und von mir im Jahr 1835 beschrieben und abgebildet." I am unable, however, to find that Kittlitz ever published a description or figure of the animal, or that the name *Spermophilus brunniceps* has ever appeared elsewhere. Brandt appears not to have published it, as in 1844 (Bull. Acad. Sci. St. Pétersb., phys.-math. Cl., Vol. II, 1844, p. 373) he identifies this same specimen with *Spermophilus parryi*. The name *Spermophilus brunniceps* as used by Kittlitz is practically a *nomen nudum*, since the only feature mentioned, the number of mammæ, cannot be considered as sufficiently distinctive.

11. **Arctomys,** sp.?

SIBERIAN MARMOT.

The genus *Arctomys* is not represented in the collection. Mr. Buxton refers to a species of this genus in his notes as follows:

"*Arctomys* sp.? Marmot. Russian local name, *Tār-bahgàn*. The people living at Gichiga say that a species of marmot is found at Baronesskorf Gulf where they are abundant. Mr. W. H. Shockley, an American mining engineer, who was in charge of an English expedition which prospected the coast of Siberia for gold from East Cape to Petropavlovsk in the summer of 1900, said that they were abundant at Olutorski Gulf where they lived in the rocks along the coast. In the summer of 1901 I saw a Yakutsk native from the Kolyma River district with a cap made from their skins, and he explained to me that it was a mark of wealth to possess such a cap, although at Baronesskorf Gulf the skins are worth but sixty kopecks each."— N. G. B.

12. Evotomys (Craseomys) latastei, nom. nov.

KAMCHATKA RED-BACKED MOUSE.

Arvicola rufocanus varieté *kamtschaticus* LATASTE, Ann. Mus. Civ. di Stor. Nat. di Genova, XX., 1884, 284 (in text). The range here given as "dans le Kamtschatka, sur les bords de l'Armour, auprès du lac Baïkal, sur l'Altaï, et généralement, dans tout le nord de la Sibérie." Not *Arvicola kamtschaticus* Polyakoff, 1881.

E. latastei differs from *E. rufocanus* in its much smaller size, less angular teeth, rounder bullæ, less fulvous underparts, and darker gray sides.

A series of 18 specimens (including two in alcohol) collected at Gichiga, is provisionally referred to this species, the type region of which is northern Kamchatka. In the absence of typical representatives of *E. kamtschaticus* any other course seems inexpedient.

The Gichiga series was taken as follows: Jan. 12, 1; May 12, 1; June 25, 1; Aug. 27, 1; Sept. 11–24, 14. The January specimen is in very long, soft pelage, clear grayish white below, the sides rather light clear gray, and the back yellowish rufous, with numerous long black-tipped hairs. The May specimen is in shorter, less full pelage, with the color much as in the January specimen, except that the rufous of the back is more dilute, through the less developed fur, but of the same tint. The adult September specimens are darker, the sides being of a darker gray, the ventral surface deep pure gray with a whitish wash, and the back dark rufous or chestnut. Young specimens about two thirds grown, partly in the soft woolly pelage of the young, have the sides and lower surface practically as in September adults, but the back in one specimen (the youngest) is only slightly suffused with rufous, restricted to the median region; in others, somewhat older, the rufous is stronger and suffuses a broader area.

The external measurements of 10 adults are as follows: Total length, 128 (120–140) mm.; tail, 29 (24–33); hind foot, 19 (18–20). Six adult skulls measure as follows: Total length, 23.6 (22.5–25) mm.; basal length, 20.5 (19–22); zygomatic breadth, 13 (12–13.8); nasals, 6.2 (5.7–6.5).

[The name *kamtschaticus* (*Arvicola rufocanus* var. *kamtschaticus* Lataste, 1884) cannot be used in this connection, owing to the previous *Arvicola kamtschaticus* of Polyakoff (1881). It may therefore be called *Evotomys latastei*, after the author who first recognized the form.

13. Evotomys wosnessenskii (*Polyakoff*).

WOSNESSENSKI RED-BACKED MOUSE.

Arvicola wosnessenskii POLYAKOFF, Zapiski Imp. Acad. Sci. St. Pétersb. XXXIX., No. 2, 1881, 56.

Evotomys wosnessenskii MILLER, Proc. Acad. Nat. Sci. Phila. 1898, 361. Description, synonymy, etc.; Bering Island and Petropaulski, Kam.

This species is represented by 83 specimens (including six in alcohol), all taken at Gichiga, as follows: April 10–13, 2; June 29, 1 (juv.); July 26–29, 4 (2 juv.); Sept. 24 and 30, 2; Oct. 2–27, 49; Nov. 1–11, 15; Dec. 15 and 20, 2. All but twelve are adult and are exceedingly uniform in coloration. The two April specimens and the two December specimens have the red of the back a little lighter or paler than the September-October series, with the pelage longer and fuller, and the tail more heavily clothed. The young specimens (half to three fourths grown) are duller colored, with the soft woolly pelage of immaturity, and the red of the back not fully developed. Two nursing young, in very short close pelage, have the dorsal area orange rufous, the sides orange, and the ventral surface yellow in one specimen and white in the other, in which latter also the sides are somewhat paler. This coloration cannot be considered as due to the effect of formalin or alcohol, as the adults preserved with them, when removed from the preserving fluid and dried, do not differ from the skins.

In adult autumn specimens the back is rich chestnut rufous varied with black-tipped hairs; sides yellowish buff; ventral surface clear dull white, the plumbeous underfur imparting a grayish cast. About one specimen in ten has the ventral surface faintly washed with buff, strongest posteriorly.

This series does not differ appreciably in coloration or cranial characters from specimens in the U. S. National

Museum from Bering Island and Petropaulski, Kamchatka. The latter measure slightly larger in total length (collector's measurements from the fresh specimens), with shorter tail and slightly smaller hind foot, but the discrepancy may be due to different methods of measuring.

Measurements.— Ten adult males and ten adult females measure as follows: *Males:* Total length, 128.8 (121–137) mm.; tail vertebræ, 29.6 (26–34); hind foot, 18.8 (17–22). *Females:* Total length, 130.4 (120–136); tail vertebræ, 30.1 (26–32); hind foot, 18.3 (18–19). Eight adult Bering Island and Petropaulski specimens (collected and measured by Dr. L. Stejneger) measure: Total length, 137 (134–143); tail vertebræ, 27.5 (23–35); hind foot, 17 (16–17.5).

The hairiness of the tail varies greatly with the season and individually, in some specimens the tail being thinly haired and lightly pencilled; in others, taken at nearly the same time, the tail is very thickly haired and has a heavy pencil.

Mr. Buxton apparently did not recognize that there were two species of Red-backed Mice in his collection. His field notes, covering both *E. wosnessenskii* and *E. latastei*, are as follows:

"Russian name, *Mysh.* This is undoubtedly the most abundant mammal found in the territory I visited, although the series in the collection is the result of one year's continuous trapping for them. At Gichiga they are found everywhere on the tundra except in the more barren places where nothing but moss and lichens grow. In places where there is a growth of grass and flowers or low shrubs, and along streams and in timbered places, they are most abundant. They are also common about houses. When I took up quarters in my cabin many were living there, which I soon caught; and at that time there were a great many open containers of hardbread, peas, beans, and cracked buckwheat. Later in the year I found a number of collections of these things about the house which they had made. In one old boot was more than one quart of hardtack crumbs, buckwheat, rice, and peas. At Kooshka there are three government storehouses standing in a row. The two end ones are 100 yards apart. In one end house are kept rice, flour, and buckwheat, and in the other

metal goods and manufactured wares. In this latter house the storekeeper often finds large accumulations of rice and buckwheat which have been brought by the mice from the other magazine more than three hundred feet away. In the houses they are active during the entire year, and I think young are born in every month, but on the tundra they are inactive during the winter; I caught the most there during August and September, and very few during the summer. In the moist places where the fine grass grows, grass cuttings and droppings are plentiful, but baited traps set there caught very few of them. I caught several in my cabin with their cheeks filled with rice." — N. G. B.

14. **Evotomys jochelsoni,** sp. nov.

KOLYMA RED-BACKED MOUSE.

Type, No. 19538, ♀ ad., Verkhne Kolimsk, Kolyma River, February, 1902; W. Jochelson, Jesup North Pacific Expedition.

Based on two adult specimens preserved in spirits, collected by Mr. Jochelson as above. Dorsal area, from front of crown to tail, bright rufous, with a slight intermixture of black-tipped hairs, the pelage being dark plumbeous for the basal two thirds, then banded with ochraceous and broadly tipped with rufous; sides ochraceous, including the front and sides of the head; ventral surface bright buff; tail above dusky, sides and below bright buff, heavily clothed; ears tipped with rusty internally.

Measurements.— Type: Total length, 107 mm.; head and body, 85; tail vertebræ, 22; hind foot, 17. The other specimen has a defective tail (probably due to injury in life), measuring as follows: Head and body, 80; tail, 13; hind foot, 17. *Skull,* total length, 22; mastoid breadth, 11; length of nasals, 6.3.

This species differs from *Evotomys wosnessenskii* and *E. rutilus* through the much lighter red of the dorsal area, the strongly ochraceous sides, and the buffy underparts. It is also smaller. It differs so radically in coloration from the *Craseomys* group (*E. rufocanus* and *E. latastei*) that no comparison with these forms is necessary.

15. **Microtus kamtschaticus** (*Polyakoff*).[1]

KAMCHATKA VOLE.

Arvicola kamtschaticus POLYAKOFF, Zapiski Imp. Acad. Sci. St. Pétersb. XXXIX., No. 2, 1881, 43, fig. 4, dentition. Kamchatka.

Microtus kamtschaticus MILLER, Proc. Biol. Soc. Wash. XIII., 1899, 11 (in text).

Represented by 33 specimens, of which 12 were collected at Marcova, March 7–20, and 21 at Gichiga, the latter as follows: Jan. 12, 1; July 28, 1; Aug. 1–3 and 29–31, 5; Sept. 1 and 24, 2; Oct. 1–4, 12. One of the specimens is very old, 9 are fully adult, and 8 are young adults, the rest being immature, of various ages, from nurslings to specimens one half to two thirds grown. The January specimen is only about half grown, the March series contains two less than half grown, some of the July specimens are quite young, and the October series includes nursing young, half grown, and adults; hence, apparently, young are reared at all seasons of the year.

The March series of adults are in full soft winter pelage, with heavily furred tails, and the dorsal pelage about 20 mm. long. They differ greatly in respect to pelage from the July, September, and October adults, in which the coat is quite short and the tail thinly haired. They are also darker and browner. There is, however, much individual variation in color, and in the length of the tail, in specimens taken practically at the same date, there being a tendency to a yellowish brown phase and to a reddish brown phase, with many intermediates. The March adults are strong buffy brown above varied strongly with black-tipped hairs, the general color ranging in tone from yellowish brown to slightly rufescent brown; lower parts clear grayish white, the plumbeous underfur tinging the otherwise nearly clear white superficial tint. The tail is sharply bicolor, the lower surface being white and the upper surface blackish mixed slightly with gray-tipped hairs; feet dull grayish white.

In September specimens the dorsal pelage is only about

[1] Poliakoff appears to attribute the name *kamtschatica* to Pallas, citing a "*Mus œconomicus*, var. *kamtschatica* Pallas, Novæ spec. Quadrp. e Gliri Ord. p. 233." But Pallas did not use the name in a nomenclatorial sense, but in a descriptive or geographical sense. He says: "Varietas Kamtschatica muris œconomi, cujus exuvias habeo," etc. The name should therefore date from Polyakoff, 1881.

12–15 mm. long, and of a deeper, more reddish brown, varied with black, giving a much darker general effect. The ventral surface is whitish gray with a very slight wash of buff. The color of the young in the woolly immature coat is in general similar to that of fall adults, but of a duller tint above and more plumbeous below.

Three additional specimens, taken at Indian Point, Siberia, by Mr. Bogoras, seem not in any way distinguishable from the Gichiga and Marcova specimens collected by Mr. Buxton.

The following table gives the external measurements of 18 specimens, taken by Mr. Buxton from the fresh specimens, arranged in the order of size, with which are included the two principal measurements of the skull, when the skull is not too much broken to be available. The specimens range in age from young adults to very old, some of the last six being still partly in immature pelage.

MEASUREMENTS OF *Microtus kamtschaticus*.

Mus. No.	Locality.	Date.	Sex.	Total Length.	Tail Vertebræ.	Hind Foot.	Total Length of Skull.	Zygomatic Breadth.
18580	Marcova	March 20, 1901	♀	190	48	20	28.5	—
18594	Gichiga	Sept. 1, 1900	♀	185	50	21	—	—
18610	"	Aug. 16, 1901	♀	180	46	22	28	15
18581	Marcova	March 20, 1901	♂	175	45	23	29	—
18588	Gichiga	Aug. 3, 1901	♀	175	44	19	27	15.4
18586	"	" 2, "	♀	172	46	20	25	16
18578	"	Oct. 3, 1900	♂	170	45	22	—	15
18600	"	" 4, "	♂	166	50	21	—	—
18585	"	July 28, 1901	♂	166	41	21	27	15
16001	"	Oct. 4, 1900	♂	160	44	21	—	—
16587	"	Aug. 1, 1901	♀	156	41	19	—	14
16576	"	Sept. 2, 1900	♂	146	36	21	25.3	14
16577	"	Oct. 3, "	♀	144	36	22	25.5	14
16582	Marcova	March 20, 1901	♂	144	33	21	25.6	14.6
16583	"	" " "	♂	138	36	21	—	—
16579	"	" 7, "	♂	137	29	22	26.5	14.5
16593	Gichiga	Aug. 31, 1900	♂	136	35	22	25	14
16584	Marcova	March 20, 1901	♂	134	32	21	24	13

The above-described specimens of *Microtus* from Gichiga and Marcova have been compared with a series from Kamchatka identified by Mr. Gerrit S. Miller as *M. kamtschaticus*, and do not appear to either Mr. Miller or myself to differ from them.

UNIVERSITY OF CALIFORNIA

"Russian local name, *Mysh.* This species is not as common as the Red-backed Mouse and is more partial to the houses. The majority of the specimens in the collection were taken about cabins. The others were taken in the same place as the Red-backed Mice. It is also active about the houses during the winter, but continuous trapping on the tundra during the winter revealed none there. It is possible that the grass cuttings and droppings in grassy places are done by this species. They also accumulate large stores of provision, and their habits and distribution, so far as I observed, are practically the same as those of the Red-backed."—N. G. B.

16. **Dicrostonyx torquatus** (*Pallas*).

PIED LEMMING.

A single specimen of *Dicrostonyx* was collected by Mr. Buxton near Gichiga, June 23, 1901. It closely resembles in coloration June specimens of *D. nelsoni* Merriam from Point Barrow, Alaska. The skull is broken, only the lower jaw and rostral portion being present. In the absence of specimens of *D. torquatus* for comparison, it is provisionally referred to that species. Mr. Buxton refers to this specimen in his field notes which here follow, and to which he has added some very interesting and hitherto unpublished notes on the two species of Lemming observed by him at Point Barrow, Alaska.

"No. 840, male, 6-23-'01. This specimen was brought to me by a Tungus who caught it near their summer encampment at Chevitka, 10 miles down the mainland coast from Kooshka. He said that this was the only one that he had ever seen there, but far inland they were common. I showed it to the captain of the Cossacks, S. I. Pahderin, a man 54 years of age who had lived here all his life, and he said that during April and May, 1900, there were hundreds of them on the tundra about Gichiga. The dogs hunted them day and night at that time and required no other food. The people here had never seen one previous to that time and were greatly puzzled to know from where they had come and whither they had gone. They have no distinct name for it

and simply call it 'mysh' or mouse. The commanding officer, Ankoodeenoff, also said that he caught two of them in his house in the spring of 1900. I saw the track of one on the snow in February, 1901. Their tracks are very easily distinguished from those of the mice, or even from those of *Lemmus*, as the long, stiff hairs protruding beyond the toes of *Dicrostonyx* drag on the snow and make a very characteristic track.

"Concerning specimens of *Lemmus trimucronatus* and *Dicrostonyx hudsonius alascensis* Stone [= *D. nelsoni* Merriam, of 10 days' earlier date], taken by the McIlhenny Expedition to Point Barrow, Alaska, 1897–98: As far as I observed, the habits of these two species of lemmings are the same. During the summer they are seldom seen, and then only while running from one burrow to another, as at that time their runways are under the moss which covers the tundra everywhere. In winter, when the moss freezes, they run tunnels in all directions on the tundra just under the snow and up to the surface of the snow. After a high wind many may be seen running about on top of the snow, apparently lost or unable to regain their burrows. This gives rise to the superstition, which is current among the coast Eskimos from the mouth of the Mackenzie River to the Yukon, that the white ones are sent whirling down with the snow from the sky by Puk-ai-mu-ña as his messengers, and that when they have accomplished their mission they disappear. They call them Kĭl-ĭ-mai-u-tah, and are adverse to killing them. The Norwegians also have a similar superstition concerning this species in winter dress.

" In summer their nests, runways, and droppings are encountered everywhere on the tundra, especially on the higher, black hummocks and along low banks which border the lagoons. In winter and spring they are often found far out on the sea ice, sometimes two or three miles from shore. The statements made by other writers concerning their comparative scarcity and abundance in different years is verified by the natives and whites here. The young, at least of *Lemmus hudsonius alascensis*, are born every month in the year. Six is the usual number brought forth at a time. Their food consists of grass and weed seeds and bulbous roots.

"Mr. Brower, who had been at Point Barrow 10 years as a trader, had never seen a *Dicrostonyx* until we showed him one, although he had observed many *Lemmus* and one large migration in 1888. Our series of the former contained 48 specimens, all that we could obtain, while that of the latter contained 606, and we could have taken many times that number had we cared to do so.

"During May when the snow was melting, leaving only patches scattered over the tundra, one could see hundreds of them in a day's walk on the tundra. At that time the moss is still frozen so they cannot burrow in it. On one day at this time our Japanese cook killed 105 in one day. On June 21, 1898, I counted over 100 in a fox burrow. On June 7, 1898, found five *Lemmus* and two *Dicrostonyx* in a nest of the Snowy Owl, both of the latter still white enough to be very conspicuous against the black tundra.

"Considering that these two lemmings have about the same habits and the same environment it would be interesting to know why the one that changes to white during the winter and has horny pads on his fore feet, and is apparently better fitted in every way to elude his enemies and obtain food, is so much rarer than the other form which is not so well equipped." — N. G. B.

17. **Lemmus obensis chrysogaster,** subsp. nov.

GOLDEN LEMMING.

Myodes schisticolor MIDDENDORFF (not of Liljeborg), Sibirische Reise, Säugethiere, 1853, 108. "Westküste des Ochotskischen Meeres (Ajan)."

Type, No. 18762, juv., Gichiga, west coast of Okhotsk Sea, July, 1901; N. G. Buxton, Jesup North Pacific Expedition.

Two specimens, a skin and skull, and a specimen in spirits, taken by Mr. Buxton at Gichiga, July 26, 1901.

The spirit specimen (type), dried out to show its coloration, is yellowish brown above varied with black, more grayish brown and less yellowish on the head and neck, the fulvous tint gradually increasing in brightness and amount from the shoulders posteriorly, becoming strong yellowish rufous on the lower back and rump; sides and ventral surface orange ochraceous, paler on the throat and at the base of the tail; chin and sides of mouth soiled buffy white; top of nose pale

dusky brown, passing posteriorly into the dull yellowish gray-brown of the upper surface of the head; feet dusky grayish brown; claws dusky horn color; ears very small, orbicular, wholly concealed in the fur; tail very short, the upper surface dusky, the lower surface and a long pencil grayish white. Incisors pale yellow.

Measurements.— Total length, 97 mm.; head and body, 78; tail vertebræ, 10; tail to end of pencil, 20; ear from crown, 4; hind foot without claws, 14; with claws, 17; claws of fore foot, 6.

Skull.— Total length, 25; basal length, 22; length of nasals, 6; length of palate, 13.5; zygomatic breadth, 16.5; mastoid breadth, 13; interorbital constriction, 4; upper toothrow, 7.

The skin belongs to a young adult, which differs from the spirit specimen in being much darker and less ochraceous; dorsal surface dusky brown, almost blackish over the whole middle region of the back, with a very short tipping of pale rusty on some of the hairs, imparting a faint rusty general tint; sides ochraceous; ventral surface rusty buff, palest on the throat.

This species differs from *Lemmus obensis* (Pallas), as described in great detail by Middendorff (Sibir. Reise, Säuget., pp. 99–108, pll. VIII–X) from a large series collected on the Taimyr River, in the much richer, brighter orange color of the sides and upper parts, and the orange ochraceous instead of whitish ventral surface. It agrees more closely in coloration with Point Barrow specimens of *Lemmus alascensis* Merriam, but the under parts are brighter, and it is very much smaller. The two skulls, both quite young, show no distinctive cranial differences.

This is doubtless the *Myodes schisticolor* Middendorff, but not the *M. schisticolor* of Liljeborg. Middendorff's specimen was a skin and skull brought by Wosnessenski from Ajan (or Ayan), on the west coast of Okhotsk Sea, about 600 miles south of Gichiga.

18. **Ochotona kolymensis,** sp. nov.

KOLYMA PIKA.

Type, No. 19535, ♂ ad., Verkhne Kolimsk, Kolyma River, Yakutsk, Siberia, December, 1901; Waldemar Jochelson, Jesup North Pacific Expedition.

Based on two specimens in alcohol, collected as above. Pelage very soft and thick. Above pale yellowish brown, strongly varied with black over the median area, less black and more strongly yellowish on

the sides; the hairs individually plumbeous for their basal three fourths, then abruptly pale fulvous and tipped with black; head less fulvous and more grayish; ventral surface soiled yellowish white, strongest over the pectoral region, the plumbeous underfur well concealed by the light tipping of the hairs; feet soiled grayish white with a faint buffy tinge above, dull brownish gray beneath; ears with a narrow pale rim, the long hairs within pale buffy gray, the short hairs clothing the outer surface dusky plumbeous; nose and upper lip dusky brownish, sides of nose lighter, buffy gray.

Measurements. — Head, 43 mm.; body, 110; total length (approximate), 153; hind foot, 24; ear from crown, 12. (Correct measurement of the length in a straight line is difficult owing to the rigidity of the specimens and their bent positions.)

Skull.— Total length, 37 mm.; basal length, 29; zygomatic breadth, 14; mastoid breadth, 19; length of palatal floor, 3; length of nasals, 10.8; upper toothrow, 7.

This species appears to differ strongly from *O. littoralis* (Peters), from the eastern end of the Chukche Peninsula, in general coloration, and especially in the absence of all trace of ferrugineous on the sides of the neck and throat, and it is also larger. It differs from *O. hyperboreus* (Pallas), also from the Chukche Peninsula, in its somewhat larger size and in having the upper parts pale yellowish brown instead of ferrugineous. It appears to have no very close relationship with *O. alpinus* (Pallas), from the Altai Mountains, differing from it in coloration and smaller size.

19. **Lepus gichiganus,** sp. nov.

GICHIGA HARE.

Type, No. 18286, ♂ ad., Gichiga, west coast of Okhotsk Sea, Jan. 11, 1901; N. G. Buxton, Jesup North Pacific Expedition.

Winter pelage, pure white, generally to the extreme base of the underfur; in some specimens the extreme base is pale gray. Ears narrowly tipped with black.

Summer pelage, head and back gray-brown tinged with yellowish brown; sides, lower back, rump, and thighs clear dark gray; ears tipped with dark yellowish brown.

Measurements.— Total length (type), 584 mm.; tail vertebræ, 75; hind foot, 173; ear from notch (in dry skin), 78. *Skull,* total length, 93; basal length (Hensel), 74; postpalatal length, 55; greatest zygomatic breadth, 49; mastoid breadth, 33; postorbital constriction, 19; length of nasals, 38; breadth of nasals at base, 21; length of upper

toothrow (on alveolar line), 17; length of lower jaw, 67; height of lower jaw, 46.

Young female, about one third grown.— General color above grayish brown with a faint fulvous tinge; the abundant woolly underfur is pale plumbeous at base, with the apical third pale rusty fulvous; the longer overhair is dusky, broadly ringed subapically with white, and ending in a fine blackish tip; ventral surface clothed, from the upper breast posteriorly, with very soft, thick, fine woolly fur, which over the whole pectoral region is pure white to the base, but along the sides and posteriorly is at the base pale plumbeous; a broad prepectoral band dusky grayish brown; chin and throat plumbeous with the fur broadly tipped with white, giving a grayish white superficial tint; sides of the nose and edge of upper lip pale rusty buff; tip of nose dusky, followed as far back as the eyes by a broad facial band of gray; top of head like the back but rather darker; sides of head from nose to base of ears pale grayish rusty buff; ears internally blackish brown washed with pale rust, becoming more fulvous at the tips, which are edged with black; outer border of ears edged with white for the basal three fourths, the white diminishing in amount from the base apically; posterior surface of ears broadly whitish on the outer half, passing into buffy gray on the inner half with the dusky base of the hairs showing more or less at the surface; tail above gray mixed with blackish, under surface of tail light gray; upper surface of fore feet pale yellowish brown, the under surface whitish, adventitiously stained yellowish; hind feet white externally, yellowish brown on the inner edge and on the toes; soles clothed with dusky hairs, the toes yellowish.

An adult female, taken May 28, is still partly in winter dress, but on the head and back the summer pelage is well developed, though thinly veiled in places by the left-over white hairs of the winter coat, while the nape, shoulders, sides, and whole ventral surface are still heavily covered with the winter coat. The general color of the new, short, summer coat is dark grayish brown suffused rather strongly with buffy yellow. The sparse underfur is pale buffy gray; the longer hairs are broadly banded near the tip with dark brown and tipped with yellowish. The upper surface of the head is rather more yellowish than the back, and the sides are darker, more grayish brown and less yellowish than the back, while the lower back and rump are dark gray. The ears are still mostly white, but the tips have changed from black to dull yellowish brown. The tail is still wholly white, and the feet have undergone little change from the winter dress.

A male taken October 1 has nearly completed the change to winter dress. The top of the head and the back show traces of the summer coat, there being a strong mixture of yellowish brown and black-tipped hairs on the crown, and a slight sprinkling of similar hairs over the middle region of the back.

In full winter dress the pelage is very thick and soft and, including the underfur, pure white to the base, except the ears, which are very narrowly tipped with black.

This southern form of the Siberian Arctic Hare is represented by 24 skins and skulls, 2 additional skins, 2 skeletons, and 14 additional skulls, taken in the vicinity of Gichiga by Mr. Buxton. They are all in white winter pelage except three, and were collected as follows: Oct. 1, 1; Nov. 5 and 6, 2; Jan. 11, 7; Feb. 1, 12; Feb. 15, 12 (skulls only); July 27, 1 (young).

The weight of three specimens, as recorded by Mr. Buxton, is, respectively, $7\frac{1}{2}$, 8, and $8\frac{1}{4}$ pounds. Whether these were of average size or exceptionally large is not stated.

The table on page 158 gives the external measurements of 20 adult males and 17 adult females, taken by Mr. Buxton from the fresh specimens, and also the two principal measurements of the skull. The range of variation is not very large, and is due in part to immaturity, the smaller specimens being shown by the skull to be the younger members of the series. The females average slightly smaller than the males, except in respect to the length of the tail which, as often happens in other species, is longer in the females than in the males.

It is probable that the Arctic Hares of Europe and Asia are all referable as subspecies to *Lepus timidus* Linn., but in the absence of material for their investigation the Siberian forms are treated under binomial names. *Lepus canescens* of Nillson, from southern Scandinavia, is said to have a similar representative in the Stanovoi Mountains of southeastern Siberia, and indeed by some writers, as Middendorff and Radde, they have been considered as indistinguishable. It seems, however, probable that very appreciable differences would be found on comparison of adequate material from the two reigons. Nordquist has considered the Northeast Siberian form as a variety of *L. timidus*, for which he has proposed the name *Lepus timidus* var. *tschuktschorum* (Vega-Exped. Vetensk. Iakt., II, 1883, pp. 84–90). The form here described differs from the latter in considerably smaller size, less massive skull, much lighter dentition, and apparently a more

tawny summer pelage. The cranial differences and the difference in size are shown by the single specimen from Chaplin Point, extreme northeastern Siberia, described below.

MEASUREMENTS OF *Lepus gichiganus.*

Mus. No.	Sex.	External Measurements.			Skull.	
		Total Length.	Tail Vertebræ.	Hind Foot.	Total Length.	Greatest Zygomatic Breadth.
18279	♂	595	54	170	—	—
18280	♂	600	86	159	42.5	49
18282	♂	570	61	156	94	48
18285	♂	555	50	166	91	47.5
18286	♂	584	75	173	93	49
18289	♂	582	60	159	91	49
18290	♂	593	76	166	95	49
18291	♂	624	77	167	—	—
18292	♂	597	80	162	93	48
18293	♂	565	75	170	93	48.3
18294	♂	583	74	162	95	50
18296	♂	594	79	165	99	42
18298	♂	562	76	163	95	50
18299	♂	565	81	164	97	50
18303	♂	552	74	159	—	—
18307	♂	576	81	159	90	46
18308	♂	580	70	163	93	48
18309	♂	620	76	167	98.5	48
18312	♂	590	74	173	92	48
18314	♂	558	74	160	92	48.3
18281	♂	585	76	167	91	47
18283	♀	563	61	156	91	45.3
18284	♀	562	61	146	88	45
18287	♀	552	73	160	91	48
18288	♀	558	69	155	90	47
18295	♀	588	85	165	94	49.7
18297	♀	562	76	159	91	47
18300	♀	563	82	168	90	49
18301	♀	590	80	167	92	49
18304	♀	560	80	169	—	—
18305	♀	575	71	160	90	47
18306	♀	573	79	164	—	—
18310	♀	570	68	160	88.5	47.5
18311	♀	568	81	162	95	48
18313	♀	550	69	156	—	—
18315	♀	555	75	166	91	46.5
18316	♀	575	77	168	92	47
Average of 20 adult males		582	66.6	164	94	48.7
Average of 17 adult females		577	74	162	91	46

"Russian name, *Zaisch;* Siberian name, *Oo-skon.* An abundant resident in suitable localities at all places that I visited in Northeast Siberia. I saw it at Okhotsk, Ola, Gichiga, and Marcova. Mr. Jochelson says that it is abundant along the Kolyma River and its tributaries, and that a few [*Lepus tschuktschorum*] were found near the New Marine Post at the mouth of the Anadyr. Along all the streams, and wherever there was a growth of trees or bushes between Gichiga and Marcova, I saw evidences of them. In many of these places the snow was simply packed down by their feet and littered with their droppings. They are especially fond of the bark of the young willows, and I have seen sprouts entirely stripped of the bark for a distance of three feet above the snow, and others over two inches in diameter entirely gnawed in two. They are never seen during the day unless startled from their burrows in the snow-drifts or under fallen trees, but they are very active at night, especially clear ones. They seldom stray far from their feeding-grounds and are never seen on the open tundra. The Russians catch them during the winter in deadfalls and use the meat for food and the skins for bedclothing. Every family has a number of bed blankets made from their skins, and they are very warm and serviceable. A skin has a local value of about 5 cents." — N. G. B.

20. **Lepus tschuktschorum** (*Nordquist*).

Chukche Hare.

One specimen, in full winter pelage, obtained at Chaplin Point (Indian Point of Americans), extreme northeastern Siberia, by Mr. W. Bogoras, the date being "Fall, 1901." No measurements were taken from the fresh specimen, but such measurements as can be obtained from the skin show it to be larger than the average size of *L. gichiganus*, slightly exceeding even the largest specimens of that form. Thus, the ear from the crown measures 13 mm. longer than the average length in *gichiganus* and 8 mm. more than the largest; while the hind foot (measured in the dry skin in each case) is 10 mm.

longer than the average in *gichiganus* and slightly exceeds the largest. The skull is much more massive, though only slightly exceeding in dimensions the largest skulls of *gichiganus;* the incisors are broader and thicker and the molars broader and heavier, as are also the zygomatic arches. The lower jaw is also broader and heavier.

21. **Erignathus barbatus** (*Fabricius*).

Bearded Seal.

This species is represented by four adult specimens (skins with skulls) collected by Mr. Buxton at Gichiga, Sept. 4, 1901, and two young adults collected by Mr. Bogoras at the mouth of the Anadyr. They do not differ appreciably from Greenland specimens, either in size or other features. Three of the four specimens are females and the other is a male. The male skull has a basal length of 213 mm. and a zygomatic breadth of 122; two of the female skulls (one is much broken) measure, respectively, 205 x 125 and 220 x 137 mm.

The external measurements of three of the specimens, taken in the flesh by Mr. Buxton, are as follows:

	No. 18166 ♂	No. 18164 ♀	No. 18165 ♀
Length	2300	2095	2600
Girth	1375	1410	1655
" of head	600	605	620
Distance between the eyes.	90	75	90
Tail	215	215	275
Hind foot	350	390	420

"Local name, *Nerpah;* also sometimes called *Locktock,* which is the name generally applied to it in Kamchatka. Also usually called Locktock at Marcova. A common winter resident in Okhotsk Sea and along the eastern coast of Siberia from Petropavlovsk to East Cape, and probably along the whole northern coast. Mr. Jochelson has seen it at the mouth of Kolyma River in summer. At Gichiga it is quite common, especially during July, August, and September, but does not ascend the rivers until after the 1st of August, and then only in small numbers. Mr. Sokolnikoff has observed it

during August in the Anadyr River, more than 400 versts above its mouth. All the specimens that I saw at Gichiga were much lighter in color than Point Barrow, Alaska, specimens, and not so uniformly colored. At Gichiga a skin is valued at five roubles." — N. G. B.

22. **Histriophoca fasciata** (*Zimmermann*).

Ribbon Seal.

Represented by a flat skin obtained by Dr. Berthold Laufer on the Lower Amoor River.

"Local name, *Kre-lat-ah* and *Mandar-ka*. Although this seal does not occur at Gichiga, the people there are well acquainted with it and many possess travelling bags made from their skins, which have been obtained from Oliutorski and Baronesskorf Gulfs, where they are common. Mr. Jochelson said that the Koryaks living along Penginski Gulf have taken an occasional one there, but I consider it very doubtful. Mr. Sokolnikoff says that they are common far out in Anadyr Gulf, but never come close in to shore or ascend the Anadyr River." — N. G. B.

23. **Phoca (Pusa) hispida gichigensis** Allen.

Okhotsk Ringed Seal.

Two skins and skulls of young females (see this Bulletin, XVI, 1903, pp. 478–480). Mr. Buxton's notes respecting this species are as follows:

"Local name, *Ak'-ee-pah*. A small seal, of which I saw very few. After the ice began to form in the river about the first of October, and was daily crushed up by the tide, I saw a few of this species swimming in the ice-gorged river opposite my station, and during the summer I saw a few off Matuga Island. The people say they do not come into the rivers until the ice begins to form. In February, 1901, I saw one in a Koryak lager at Shestacova, that had just been killed.

"Mr. Sokolnikoff has seen this species in the Anadyr River, 25 versts below Marcova, in summer. Their skins are in but little demand, as those of the other two species are much better and larger." — N. G. B.

24. **Phoca ochotensis** *Pallas.*

OKHOTSK SEAL.

Five specimens (skins and skulls), collected by Mr. Buxton on the Taiganose Peninsula, 20 miles south of the mouth of the Gichiga River. These are therefore topotypes of Pallas's *Phoca ochotensis*, his description of which is sufficiently explicit to render its application to the present species satisfactorily evident, as elsewhere explained (*cf.* this Bulletin, XVI, 1902, pp. 480–482). A skeleton collected by Dr. Laufer at the mouth of the Amoor River is also referred to the present species.

"Local name at Gichiga, *Ola;* at Okhotsk, Ayan, Pengina, and Marcova, *Largha.* This is by far the most abundant species of the hair seals found in the Okhotsk Sea. I saw them at Udskoi Bay, about the Shantar Islands, at Ayan, Okhotsk, Ola, Gichiga, and at Shestacova on Penginski Gulf. It, together with the other two species occurring at Gichiga, is a resident in the Gichiginski Gulf. As soon as the rivers flowing into the head of this gulf free themselves from ice, about the first of June, the Larghas ascend them at high tide as far as slack water, some four or five miles above their mouths, and again go out with the tide. They do not become common in the rivers until the first of July, when the salmon begin to run in considerable numbers, and do not reach their maximum of abundance until two or three weeks later, when the salmon have become abundant. At this time hundreds of them come in with the tide, especially when there is one per day and that occurring after midnight. At that time many go far up the river, while hundreds of them remain near its mouth, where they catch fish and 'haul out' on the low banks and islands at that point, when their snorting and growling can be heard far up the river. It is possible to shoot many of them in the river, but very few can be secured there, as they sink immediately and the strong current carries them out to sea. At high tide off the river's mouth one can see vast numbers of them catching fish. Dozens of them stick their heads out of the water, some with fish in their

mouths, within a stone's throw of your boat, and gaze in mild-eyed astonishment at you for a few seconds, give a snort, and disappear. Salmon can be seen jumping clear out of the water in all directions in their efforts to escape the seals. The Koryaks and Tunguses pitch their tents during July and August along the head of the Gichiginski Gulf at places where streams flow in and get many of these and of the Bearded Seal by shooting them from bidarkas and spearing them with retrieving harpoons along the rocky headlands.

"Catherine Gulf, 40 miles southwest from Gichiga on the mainland coast, is a long tongue-like indentation in the precipitous coast-line, 200 yards wide and a mile long. At low tide the water in it is quite shallow, and many rocks on its bottom and along its side are exposed. On the morning of August 11, 1901, I came suddenly on this little gulf while down the coast goose shooting, and every one of the hundreds of available rocks in it was occupied by seals — mostly this species and a few Bearded Seals — basking in the bright sunlight. At the report of my gun they all slid into the water and started for the open sea.

"Hair seals are much more abundant in the Okhotsk Sea than they are at any point along the Alaskan coast. They form a considerable part of the food of all the people, natives and Russians, living near the Okhotsk Sea, as they do of all the people inhabiting the high north. The skins of this species have a commercial value of one rouble each at Gichiga, and are used for boots, lines, and dog harness.

"Mr. Sokolnikoff assured me that in summer it ascended the Anadyr River nearly to Marcova." [1]— N. G. B.

25. **Ursus beringianus** (*Middendorff*).

KAMCHATKA BEAR.

The collection contains five more or less imperfect flat skins of bears, only one of which has a skull. They probably all belong to one species, the variation in size and color being

[1] This statement refers to the subspecies *Phoca ochotensis macrodens* Allen. See this Bulletin, XVI, 1902, pp. 483–485.

probably due to sex and age, three of the specimens being young.

The best specimen is No. 18275, male, represented by a nearly perfect skin and skull. It was killed on Baronesskorf Gulf (Olutorski Bay of some maps), and purchased of the natives by Mr. Bogoras. This specimen is referred to Middendorff's *Ursus arctus* var. *beringiana*. The specimen he describes and figures under this name, he informs us, came from Great Schantar Island, which is situated in the western arm of the Okhotsk Sea (Uda or Udski Bay), so that this island may be taken as the type locality of the species. Another specimen is figured and described from "Uda-Bucht," at the mouth of which is situated Great Schantar Island. The locality of the present specimen is on the east coast of Siberia, nearly opposite the head of Okhotsk Sea.

The specimen is obviously in full winter pelage and is a beautiful skin. The general color is very dark reddish brown, darker, or blackish brown, on the limbs. The hairs on the back are tipped with lighter, the light tipping increasing rapidly in length from the middle of the back anteriorly, and becoming lighter in color, so that over the shoulders the prevailing color is yellowish brown, passing on the nape and crown into pale golden fulvous. The front of the head, from the forehead anteriorly, is dark brown with a tinge of fulvous, particularly on the sides of the nose anterior to the eyes. The claws are strong and curved, those on the hind feet much worn. The longest front claws have a length of 70 mm. along the convexity, and 45 along the arc; the longest hind claw measures 40 mm. over the convexity and 17 along the arc. The length of the flat skin is 1975 mm.; the expanse from tip to tip of the extended fore limbs, 2271 mm.

The skull indicates a middle-aged animal, the sutures being still quite distinct and the teeth almost wholly unworn. Its striking features are the great breadth of the frontal region, the swollen postorbital processes, and the deep median hollow between them. Compared with skulls of *Ursus middendorffi* Merriam, from Kadiak Island, of corresponding age and sex, the breadth of the skull is much greater in proportion to its

length, the anterior narial opening is much shorter, and the molars differ in relative size and form. It much more resembles in general contour and proportions the skull of the Barren Ground Bear (*Ursus richardsoni*), as perhaps should be expected. The present skull measures: Total length, 390 mm.; basal length, 355; zygomatic breadth, 235; interorbital breadth, 105; breadth at postorbital processes, 141. These measurements are much less than those given by Middendorff of a very old skull from Great Schantar Island, and slightly less than those of his 'middle-aged' skull from Uda-Bucht.

A second flat skin, No. 18176, without skull or data, is similar to No. 18175, except that it is rather smaller and less dark, with a distinct shade of gray over the posterior half of the back, and the shoulders, nape, and top of the head are paler fulvous. Two much smaller skins, evidently of quite young animals, are very dark brown, like the adult male first described, with the light tips of the hairs of the posterior back gray, and of the front part of the dorsal region and head yellowish gray, but very much less fulvous than in the adult. One of these specimens (obtained by Mr. Bogoras at Marcova) has a broad transverse band of white across the hind neck, and a small white spot on the middle of the belly, due apparently to albinism.

A third small flat skin, probably young of the year, labelled as from Marcova, without a skull, is widely different in coloration from any of those above described. The ears, limbs, sides, and ventral surface are dark brown, tinged slightly with gray; the dorsal region is gray, becoming brighter anteriorly, the nape being pale fulvous, and the crown and cheeks pale golden fulvous. This could well be called a 'yellow' bear. Mr. A. J. Stone suggests to me that its light color indicates that it is a female, as he has found that the female of the great Alaska Bear differs from the male, just as this specimen differs from the other specimens of this series.

"Russian name, *Mĕd-vĕhd*. Bears are undoubtedly very common in the country around the head of Okhotsk Sea, as well as in the Anadyr and Kolyma River territories, along

the western seacoasts, and in Kamchatka, for all of the people in these districts tell of their great number, although one sees comparatively few skins. Notwithstanding the high prices that I offered for specimens in the flesh, or with skull and leg-bones attached, I received none, although during the summer of 1901 I heard reports every few days of the Russians seeing bears along the upper waters of the Gichiga and Ovecho Rivers. In September, 1900, I saw tracks along the Ovecho. At Gichiga they come out of hibernation about the first week in April, and at Marcova about two weeks later, and again retire the first of October. The Russians claim to be afraid of them on account of the poor firearms that they possess, and seldom attack them. The natives — Tunguses and Koryaks — locate them in winter by the vapor arising from their dens and dig them out. The Parane River, which flows into Penginski Gulf, is said to abound in small black bears. All the pelts I saw in Northeast Siberia are those in the collection. A good dark pelt brings from 10 to 15 roubles in trade or cash. Their food consists of fish and berries, both of which are abundant and easily obtained." — N. G. B.

26. **Canis lupus** *Linn.*

GRAY WOLF.

Represented by 5 skins, with their skulls, collected on the River Main, 60 miles from Marcova, by Mr. Axelrod, and by 3 skins without skulls, obtained by Mr. Bogoras near the mouth of the Anadyr River. No measurements were taken of any of the animals before skinning. They are all winter specimens, those taken near Marcova having been killed in December and February. They vary somewhat in color, particularly in the amount of black, due to the black tips of the hairs of the back, and the amount of subapical yellowish suffusion on the median area of the back. In one or two of the specimens the amount of black is very small, and in others black is the prevailing tint. In the lightest colored specimens the subapical zone of the fur is nearly or quite without any fulvous tint; in other specimens the hair of the mid-dorsal region is subapically strongly suffused with fulvous, varying

in different specimens to pale ochraceous, and in the extent of the area thus suffused, which is broadest in those with the deepest suffusion. The ears are more or less yellowish brown, most strongly so toward the base, the depth of the yellowish brown tint correlating with the intensity of the yellow suffusion of the dorsal region.

The skulls show the specimens to be young adults, with the teeth unworn and the sagittal and occipital crests only slightly developed. They range in basal length from 203 to 221 mm., and in greatest zygomatic breadth from 108 to 126 mm., both extremes being females. Compared with the northern forms of American wolves, their small size and the narrowness of the postpalatal fossa attract attention.

Lack of material prevents comparison of the series of East Siberian wolves with those of other parts of the Palæarctic region.

"Russian name, *Volk*. Wolves are extremely rare if present at all in the Gichiga country. In the Anadyr territory and along the west coast of Okhotsk Sea and inland they are common. The supply of skins received at Gichiga does not equal the local demand for them for making clothing, but at Marcova a few can always be purchased. The people of Gichiga and Marcova recognize but one species, although a priest at Ola assured me that two species were found inland from that place. All of the skins in the collection are from Anadyr." — N. G. B.

27. **Vulpes anadyrensis,** sp. nov.

SIBERIAN RED FOX.

Type, No. 18239, ♂ ad., Marcova, Anadyr Province, Siberia, Dec. 10, 1900; N. G. Buxton, Jesup North Pacific Expedition.

Similar in size and coloration to *Vulpes alascensis;* much larger than *V. vulpes* of the British Islands and western Europe, and very differently colored, with a relatively much longer and heavier tail, and much heavier dentition.

General color above bright orange rufous, darkest along median line, lighter on the sides of the shoulders, sides of the neck and cheeks, and sides of the rump, and slightly varied with gray on the head and hips; nose in front of the eyes rufous, sides of nose blackish, upper lip broadly edged with white; top of head lighter than shoulders and back,

very slightly varied with fulvous gray; apical external half of ears black, basal half and inner surface pale orange; posterior third of dorsal surface rufous varied with fulvous gray, much lighter than the anterior half of the body, and with a pale orange disk in front of the base of the tail, divided by a median band of the color of the back; ventral surface from chin to lower part of breast white, with the underfur blackish or slaty gray; rest of ventral surface rufous, lighter posteriorly, with the underfur along the median line dusky, showing strongly at the surface on the middle of the belly; tail dark rufous orange, the long hairs tipped with black, so that the sides of the tail when seen from above are strongly fringed with black; end of the tail broadly tipped with pure white; fore and hind limbs deep rufous, with the front surface of the fore feet black to the carpal joint, and of the hind feet black nearly to the tarsal joint, the black area narrowing proximally on the latter from the middle of the foot; base of the toes deep orange rufous; soles of both fore and hind feet brownish gray with a slight rufous tinge.

For external measurements see below, and for cranial measurements see page 170.

Vulpes anadyrensis is so strikingly different in coloration and size and in its heavy dentition from *Vulpes vulpes* of western Europe and England that no further comparison is necessary. In size and general external features, and in its heavy dentition, it bears a striking resemblance to some of the brighter colored phases of the Red Fox group of Alaska, but it is very much more deeply colored, being orange rufous above instead of fulvous or golden fulvous, with the nose, feet, and other lighter parts proportionately deeper colored.

The skull is less massive and narrower interorbitally, but the dentition is quite as heavy as in the largest Alaskan skulls.

This species is represented by 9 skins with skulls, taken in the vicinity of Marcova by Axelrod and Buxton, and by 17 hunters' skins purchased by Mr. Bogoras of the natives at Indian Point. Five of the Marcova specimens measured in the flesh as follows:

18239,[1]	♂,	Dec.	10.	Total length,	1120;	tail vertebræ,	425;	hind foot,	166.
18240,	♀,	"	"	"	"	1065;	"	"	374;	"	"	168.
18244,	♂,	Apr.	7.	"	"	1078;	"	"	430;	"	"	157.
18241,	♀,	Feb.	—.	"	"	1005;	"	"	362;	"	"	170.
18245,	♀,	Apr.	24.	"	"	1030;	"	"	410;	"	"	165.

[1] Type.

Eight of the Marcova skins represent the usual red phase, while the other is a 'cross' fox. In the red phase the general color above varies from light to dark red, lighter and brighter anteriorly, with a slight mixture of gray on the top of the head and lower back; the apical half of the ears is deep black; the anterior surface of the feet and apical half of the fore leg is black or blackish, mixed more or less with rufous, as is the upper surface of the hind feet, where the black extends up from one third to two thirds the length of the tarsus, narrowing proximally; the upper surface, and sometimes the lateral surface of the tail is conspicuously washed with black, with the extreme tip white. The ventral surface is quite variable in respect to the amount of white present, which covers the sides of the upper lip, the chin, throat, and breast, with the underfur of the throat and breast more or less slaty black; there is often a less well-defined whitish area over the extreme posterior ventral surface, and sometimes an irregular whitish median band connects the broad white area of the throat and breast with the smaller white anal area.

In the 'cross' specimen the whole ventral surface is black, — deep black on the chin, throat, and breast, and brownish black over the rest of the ventral surface; edges of the upper lip, and the sides of the face in front of the eyes also black, and the feet and limbs are more extensively brownish black than in the red phase. The dorsal surface is dark reddish brown varied posteriorly with gray, — not yellow as in the Alaskan 'cross' fox. The tail is also more heavily washed with black, with, however, the usual white tip. The sides of the shoulders and chest, the sides of the neck, and the area at the anterior base of the ears, and at the sides of the base of the tail, is much lighter than the general coloration, being in this example bright yellowish rufous, becoming rich orange rufous at the anterior base of the ears, but lightening to pale yellow at the sides of the base of the tail.

The following are the measurements of the series of skulls from Marcova.:

MEASUREMENTS OF SKULLS.

Cat. No.	Sex.	Date.	Basal Length.	Palatal Length.	Postpal. Length.	Nasals.	Zygom. Breadth.	Interorb. Breadth.	Breadth of Rostrum.	Pm. 4, along Outer Border.
18239[1]	♂	Dec. 10	142	72	70	59	80	26	23	15
18240	♂	" "	138	68	67	55	74	28	24	14.3
18242	♂	" "	136	69	66	55	72	27	24	14
18244	♂	Apr. 7	140	71	70	52.5	79.5	29.5	24	13.6
18246	♂	Dec. —	135	—	—	—	74	28	22	13.6
18245	♀	Apr. 24	141	71	68	54	75	25.5	22	14
18243	?	Dec. —	132	—	—	—	73	—	23	13.5

[1] Type.

"Red Fox. Russian name, *Lee-see-sha.* None of the foxes are abundant or even common in the Gichiga valley although, comparatively speaking, the red form is the commonest there, as it is in the Anadyr Province. The traders at Gichiga and Marcova receive each year a large number of pelts from the inland natives and from the Koryaks inhabiting the country lying between these two places and the Chukchees, to the north and west of Marcova. Many are also received at Gichiga from the country lying along the west coast of Okhotsk Sea. The people employ native traps to catch them, and also resort to the illegal use of strychnine when they can obtain it.

"I saw no foxes nor any signs of them at Gichiga although I saw many tracks along the Pengina, Ocklon, and Orlofki Rivers during February and March, 1901. Pelts bring from 4 to 5 roubles each.

"Cross Fox. Russian local name, *See-woy-dóos-ka.* Cross foxes are rather common all over that portion of Northeast Siberia where the red fox occurs, and a considerable number of pelts are annually received by the traders at the different settlements. The average price is 15 roubles each.

"Black or Silver Gray Fox. One poor, mutilated pelt was received by a trader at Gichiga from Yamsk in the spring of

1901, which was valued at 40 roubles. One taken at Ayan in the winter of 1899–1900 sold in the market for 1500 roubles." — N. G. B.

28. **Vulpes lagopus** (*Linn.*).

ARCTIC FOX.

Represented by one specimen, in 'blue' coat, taken April 1, 1901, at Kamenskoi, on Penginski Gulf; by 4 specimens taken at Marcova, in December, by Mr. Axelrod; by 12 winter specimens collected by Mr. Bogoras at the mouth of the Anadyr River, and by 18 hunters' pelts bought by Mr. Bogoras of the natives at Indian Point. Of these 35 skins 12 only have skulls, and one only has measurements or indication of sex. This specimen, a male, taken at Marcova, March 10, 1901, measures: Total length, 940; tail vertebræ, 345; hind foot, 150. No. 18248, from the mouth of the Anadyr, without date, is apparently in summer coat, the pelage being ragged and more or less worn. The general color above is soiled yellowish white, with the underfur dingy gray or grayish brown. The ears, and the fur surrounding them, are dull chestnut brown; the nose as far back as the eyes, a broad space enclosing the eyes, and the chin, are dusky brown. The ventral surface is dusky grayish brown, darker and more rusty on the anterior half. The feet and legs are dull rusty brown, the apical portion of the hairs lighter and more yellowish.

The winter specimens are superficially white, or slightly yellowish white, with the thick woolly underfur more or less tinged with gray at base, the amount of gray varying in different specimens, from nearly none to a strong infusion. Some of the specimens show a slight mixture of blackish hairs overtopping the general surface.

The April specimen in 'blue' coat from Penginski Gulf is dull dark brown all over, with a slight reddish tinge, with the underfur light gray, and the soles of the feet whitish. This is the 'blue' fox pelt referred to by Mr. Buxton in his notes. It apparently is not a seasonal condition, as the pelage is long

and full and in excellent condition, and apparently the winter coat. This phase is probably a melanism, comparable to the 'black' or 'silver gray' phase of the red fox.

The ten skulls available for measurement range in total length from 114 to 126 mm., averaging 120, and in zygomatic breadth from 64 to 70, averaging 68.

"Arctic Fox. Russian local name, *Pee-seetz-(a)*. This is the next common of the foxes in the Gichiga and Anadyr regions. The bulk of the skins come from the country north of Marcova where it is abundant and the commonest form. It prefers the barren tundra to the wooded portions of the country and therefore ranges further northward. More of this species are received at Marcova than at Gichiga and other settlements further south. Pelts are valued at from three to four roubles each.

"Blue Fox. Russian local name, *Gol-o-bah pee-seez-(a)*. An occasional pelt is received at Marcova and Gichiga. The one in the collection was caught on a small river flowing into Penginski Gulf. I saw another pelt at Marcova taken at a place 100 miles northeast of that place. They are valued at 15 to 25 roubles each." — N. G. B.

29. **Gulo gulo** (*Linn.*).

WOLVERENE.

This species is represented by a skin, without skull, obtained by Mr. Axelrod, at Marcova, in the Anadyr Province, and by two young cubs obtained by Mr. Buxton near Kamenskoi, on Penginski Gulf. The cubs have a total length of about 400 mm. and could have been but a few weeks old. As shown by the skulls, the teeth had not yet pierced the gums. They are, of course, in the soft woolly pelage characteristic of extreme youthfulness, and while very different in coloration from the adults, they have the same color pattern. The light areas are pale yellowish white, more strongly yellowish on the rump and ventral surface than elsewhere; the dark areas are ashy brown, in strong contrast with the light areas.

The skin from Marcova, taken in December, has the dark areas nearly black, and the light markings white tinged with rusty; the specimen is thus darker than in average North American skins, but not darker than some of the darkest specimens now before me.

"Russian local name, *Rüs-so-mākāh.* This mammal is now not found, or at least very rarely, in the vicinity of Gichiga. In Anadyr Province it is tolerably common. One was obtained by Mr. Axelrod from hunters there which is in the collection, and I saw one that had been taken in March, 1901, near Marcova. The two young in the collection were caught near Kamenskoi, on Penginski Gulf, but I could obtain no particulars concerning their capture. They are reported plentiful in Kamchatka, and pelts bring but 5 roubles in Petropaulsk, while at Marcova and Gichiga they are worth from 10 to 20 roubles each. They are used by the Russians and natives for trimming fur garments." — N. G. B.

30. **Mustela zibellina** *Linn.*

SABLE.

This species is unrepresented by specimens. As shown by Mr. Buxton's notes, here subjoined, it has been exterminated in the region about Gichiga.

"Russian name, *Só-bel.* No Sables are found in the immediate vicinity of Gichiga, although from thirty to fifty pelts are received there annually, principally from the Pengina River region and northern Kamchatka. Mr. George H. Storck, a furrier of New York City who visited Gichiga in June, 1901, purchased thirty-five skins from a local trader for 35 roubles each, and the commanding officer at Gichiga had six. Mr. Storch said that these skins were of better quality and darker than skins from southern Kamchatka, of which he had examined several hundred for sale at Petropauvolsk. Mr. Sokolinkoff, the commanding officer at Marcova, had ten pelts from the Pengina district when I visited him in March, 1901. The average price is from 30 to 40 roubles each." — N. G. B.

31. Putorius (Arctogale) ermineus (*Linn.*)

ERMINE.

Represented by 20 adult males and 1 adult female (skins and skulls) collected by Mr. Buxton in the vicinity of Gichiga, all in the white winter pelage except one. One was taken in January, 6 in April, 2 in October, 5 in November, 6 in December, and 1 (in summer dress) in August. Besides these there are 10 skins with skulls, brought by Mr. Bogoras from the mouth of the Anadyr River, and 9 specimens in alcohol collected by Mr. Jochelson near Verkhene Kolimsk, on the Kolyma River.

The length of the black tip to the tail is variable, ranging from 65 mm. to 95, and averaging about 75, or from considerably less than half to considerably more than half of the whole length of the tail. The same range of variation is shown by a large series of *P. richardsonii* from Repulse Bay, Arctic America. These two large series show that the relative length of the black tip to the whole length of the tail is too variable a feature to have much importance in the consideration of single specimens from different localities. There is also a wide range of variation in the amount and depth of the yellow suffusing the pelage of the ventral surface, the limbs, and the basal portion of the tail. Some specimens show none, and others merely the slightest tinge, restricted to the limbs and edges of the ventral surface, while in still others the tone of yellow approaches deep chrome and covers the whole ventral surface, from the posterior border of the pectoral region to the black portion of the tail, including both fore and hind limbs, the rump, and the basal half of the tail. Several of Mr. Buxton's specimens show no tinge of yellow; nearly all of Mr. Bogoras's are either wholly without yellow or show only the slightest trace, while some of Mr. Jochelson's are without and some have a very deep shade of yellow. The single specimen in summer pelage has the whole ventral surface strongly yellow, including the breast and throat. A series of 14 specimens of *P. richardsonii* in winter pelage show little or no yellow, while 22 in summer pelage all show more

or less yellow, varying in different specimens from a faint tinge to deep yellow.

I add herewith the external measurements of 21 specimens taken by Mr. Buxton from the fresh specimen, and include therewith the three principal skull measurements, so far as the skulls are available for this purpose, a few of them being too imperfect for measurement.

MEASUREMENTS OF *Putorius ermineus*.

Cat. No.	Date.	Sex.	External Measurements			Skull Measurements.		
			Total Length.	Tail Vertebræ.	Hind Foot.	Total Length.	Zygom. Breadth.	Mastoid Breadth.
18324	Aug. 6	♂	315	88	43	—	—	—
18325	Oct. 23	♂	333	100	48	—	—	—
18326	" 30	♂	357	102	50	47.3	27.3	23.3
18327	Nov. 4	♂	333	97	51	47	27	23
18328	" "	♂	313	83	50	45.5	25.6	22.7
18329	" 15	♂	317	85	47	45.3	24	21.5
18330	" 23	♂	305	82	44	—	—	—
18331	" 24	♂	316	90	44	44	23	20.2
18332	Dec. 13	♂	365	102	54	48	27.6	23.5
18334	" 2	♂	347	102	51	45	25	23
18335	" "	♂	350	99	48	47	27	23
18336	" "	♂	345	95	48	46.5	26.3	23.8
18337	" 20	♂	335	92	45	44	24	22.5
18338	" "	♂	340	91	47	—	—	—
18339	April 5	♂	325	88	45	—	—	—
18340	" "	♂	312	74	43	—	—	—
18341	" "	♂	312	79	42	—	—	—
18342	" "	♂	318	93	49	44	24	22
18343	" 13	♂	328	93	49	45.5	25.6	22.3
18344	" 24	♂	328	83	45	—	25.3	22
18333	Jan. 12	♀	278	73	38	39.8	21	19.6
20 males average			325	90.5	47.4	46	26.5	22.6

Material from northern Europe available for comparison with the Siberian series is too scanty — four specimens only — to be of any importance, but so far as it goes the specimens from northern Europe do not differ appreciably from those from northeastern Siberia.

Externally the Siberian animal does not differ noticably from *P. richardsonii* from eastern Arctic America, of which I have some 30 skulls and nearly 40 skins, collected in the vicinity of Repulse Bay (a northwestern arm of Hudson Bay).

The Repulse Bay specimens, however, are without measurements taken from the fresh specimen, and are thus in respect to size and proportions not satisfactorily comparable with the Siberian specimens. The Repulse Bay specimens in summer coat are extremely variable in coloration, ranging from light yellowish brown to dark brown. There are, however, very marked differences in the skulls of the two forms, in *P. ermineus* the skull being long and narrow, with a low, elongate, narrow braincase, in comparison with the much broader skull of *P. richardsonii*, and relatively much deeper and much broader braincase. The skull in *P. richardsonii* averages considerably smaller than that of *P. ermineus* and has shorter, less flattened, and more widely separated bullæ.

It is interesting to note that in the Buxton series of 21 specimens only one is a female, and that there is also only one female in a series of 38 specimens from Repulse Bay. It would thus seem that the females are better able than the males to escape the wiles of the trapper.

"Ermine. Russian name, *Gór-no-stai-e.* Quite common at all the places that I visited in Northeast Siberia, although by no means abundant. They are most common in winter about the Russian and native settlements, where they are attracted by the fish and meat stored at such places. In a small outbuilding near my cabin I had a number of gulls and deer carcasses stored, and during the winter I caught ten ermines in one trap that was set there, while from a line of baited traps maintained on the tundra and under other buildings in the settlement all the time (thirteen months) that I was at Kooshka I took only one. The distinct sulphur color of many of the winter skins was more or less present in the fresh specimens, but has increased in intensity since being prepared. The pelts are valued at from 20 to 30 kopecks each." — N. G. B.

32. **Putorius (Arctogale) pygmæus,** sp. nov.

PIGMY WEASEL.

Type, No. 18322, ♀ ad., skin and skull, Gichiga, west coast of Okhotsk Sea, Siberia, Oct. 2, 1900; N. G. Buxton, Jesup North Pacific Expedition.

Summer pelage.— Above dark reddish brown, including the anterior surface of the fore limbs to the carpus, and the outer surface of the hind limbs to the base of the toes; ventral surface, inside of the limbs, fore feet, and apical half of hind feet white, the ventral surface unmixed with any brown mottling; edge of upper lip and lower half of cheeks white, like the ventral surface; ears very small, brown like the dorsal surface; tail very short, much shorter than the hind foot, wholly brown, uniform with the color of the back, the tip not dusky.

Winter pelage.— Wholly pure white, including the tip of the tail.

Measurements.— Type: Total length, 158 mm.; tail vertebræ, 16; hind foot, 21. *Skull*, total length, 28.5; zygomatic breadth, 13.3; mastoid breadth, 12.5.

A second specimen in summer pelage from Marcova, without measurements and skull imperfect (see Mr. Buxton's notes below), is similar in coloration to the type, but slightly larger and evidently a male.

Besides the two specimens in summer pelage — one from Gichiga and one from Marcova, as already noted — there are two in winter pelage, in alcohol, collected by Mr. Jochelson at Verkhene Kolimsk, on the Kolyma River, in January, 1902. These are male and female, and measure as follows: Male: Total length, 184 mm.; tail vertebræ, 19; hind foot, 23. Female: Total length, 166; tail vertebræ, 13; hind foot, 19.

The measurements given by Mr. Stone for *Putorius rixosus eskimo* (Proc. Acad. Nat. Sci. Phila., 1900, p. 44) considerably exceed those of *P. pygmæus*, being for two males, respectively, total length, 204 and 230; tail vertebræ, 28 and 31; hind foot, 20; while three females range from 178 to 184 in total length, tail 22–25, and hind foot 16–23.

The much smaller size, the very short tail, and greatly reduced ears distinguish this species at a glance from true *P. nivalis*, as shown by a Swedish specimen now before me. Its nearest ally and the only species with which it needs comparison is *Putorius rixosus* Bangs, from Arctic America (type locality, Osler, Saskatchewan), from which it differs in being much smaller, with the tail only half as long as in that species. Mr. Stone's *P. rixosus eskimo*, from Point Barrow, Alaska, is nearer the Siberian form, but differs from it in larger size and in having the tail vertebræ longer than the hind foot instead

of about one third shorter. It is, however, an interesting fact that the present form finds its closest relationship with the *rixosus* group of Arctic America rather than with the Old World *nivalis* group.[1]

"The one specimen from Gichiga was taken in a mouse trap on the tundra near my station at Kooshka. During the year while I was at this station I had from 25 to 100 baited and unbaited traps set continuously, but caught only this one. Some of the residents at Gichiga said that they had never seen the animal before while others maintained that it was a young ermine, so that I consider it rare, at least in the vicinity of Gichiga. The pelt from Marcova was given me by Mr. Sokolnikoff, the commanding officer there, who caught it swimming in the Anadyr River and who said it was the only one that he had seen during his three years there.

"The specimen of *Putorius rixosus eskimo* described by Stone in the McIlhenny Collection from Point Barrow (No. 848), was a nursing female with 10 mammæ developed; another in the same series taken in the middle of June had 12 mammæ developed, and 12 fœtal young in the oviducts." — N. G. B.

33. **Lutra lutra** (*Linn.*).

OTTER.

This species is not represented in the present collection. Mr. Buxton's notes respecting it are as follows:

"Russian name, *Vee-drāh*. No otters are now found in the Gichiga country although they undoubtedly occurred there formerly. They are still taken along the smaller tributaries of Pengina and Anadyr Rivers, further inland, and in Kamchatka. I was unable to secure any specimens in the flesh or skulls, but pelts were plentiful at Marcova at from six to ten roubles each. A few pelts are shipped out by the traders each year, but the bulk of them are used by the Russian inhabitants." — N. G. B.

[1] On the Weasels of the *P. nivalis* group, see Barrett-Hamilton, Ann. and Mag. Nat. Hist. (7), V, Jan. 1900, pp. 41–50.

34. **Erinaceus orientalis,** sp. nov.

SIBERIAN HEDGEHOG.

Type, No. 18355, ♀ ad., Vladivostok, Siberia, July 18, 1900; N. G. Buxton, Jesup North Pacific Expedition.

Similar in external characters to *Erinaceus europæus*, but paler and rather larger, with quite different cranial characters. General color of the spiny dorsal area pale yellowish, the spines similar in character to those of *E. europæus*, the individual spines whitish basally with a broad median band of pale brown and a whitish tip. Head, shoulders, and sides pale grayish sandy brown; ventral surface very pale yellowish, thinly haired; head pale brown with a tinge of yellow, and an indistinct whitish spot in front of the eye, enclosed in a slightly dusky area which extends to and covers the sides and front of the nose and most of the head anterior to the eyes; feet dull pale brown, passing into a grayish yellow brown on the limbs; ears small, dusky, about as in *E. europæus;* tail short, dull brown, very thinly haired. Mammæ 6, well developed.

Measurements.— Total length, 312 mm.; tail, 42; hind foot, 50; ear (in dry skin) from notch, 27. *Skull*, total length, 61; zygomatic breadth, 39; postpalatal length, 26.5; length of nasals, 19; length of entire upper toothrow, 30.

This species is based on a single old female (teeth quite worn) bought alive by Mr. Buxton at Vladivostok of a Chinaman, who told him it was caught in Vladivostok. It differs from *E. europæus* in its much lighter coloration, and somewhat larger size, but especially in various features of the skull and teeth. The skull, in comparison with a nearly equally adult skull of *Erinaceus* from Kingsbridge, Devonshire, England, is of nearly the same length as the latter, but much broader and more massive, with the zygomatic arches much more convex outwardly, the two skulls measuring, respectively, 59 and 61 mm. in total length and 34 and 39 mm. in greatest zygomatic breadth. The rostral portion of the skull in *E. orientalis* is much broader, less sloping and less pointed than in *E. europæus*, and the premaxillæ are much broader and heavier, but much less extended and more abruptly truncated posteriorly, their line of junction with the nasals being nearly 3 mm. shorter than in skulls of *E. europæus* of less size, making the relative difference very great. The chief

difference in dentition is the very much larger size of pm^2 in *E. orientalis* and the nearly transverse position of m^3. The palatal vacuities are much broader in *E. orientalis*, and the posterior border of the palate is developed into a broad shelf behind the transverse ridge, thus differing very widely from the same part in *E. europæus*, which extends but little beyond the ridge and terminates in a central sharp spine, which is absent in *E. orientalis*. The lower jaw has about the same general form in the two species, except that the coronoid process is much broader and higher in *E. orientalis*. The lower dentition, however, is quite different in the two, through the very small size of the incisors, canines, and premolars in *E. orientalis* as compared with *E. europæus*.

There appear to be very few references to the occurrence of any species of *Erinaceus* in southeastern Siberia, and in these cases the species is referred to *E. europæus*. Von Schrenck found it near Aigun, on the Amoor River, and Radde refers to specimens collected by Maack and Maximowicz on the Ussuri River, but both Schrenck and Radde considered their specimens specifically identical with *E. europæus*.

There being apparently no available name for the East Siberian animal, I have conferred upon it the name *orientalis*, in allusion to its extreme eastern distribution. Erxleben's *Erinaceus sibiricus* (Syst. Reg. Anim., 1777, p. 172) was based on Seba's figures and brief description of his "Erinaceus Sibiricus" (Thes. I, p. 79, pl. 49, figs. 4 and 5). Seba's figures are unidentifiable, and the only hint as to the locality of his specimen is the name, which he renders in French as "Herisson de Siberie." The diagnosis, "Coloris est obscure russi; . . ."; or, "Il est d'un roux foncé, . . ." obviously does not apply to the pale East Siberian species. The only other name to be considered is *amurensis* Radde, used in his description of Plate V (Reisen im Süden von Ost-Siberien, I, 1862, p. 325), where he says: "Fig. 1. *Erinaceus europæus L.* (*amurensis*) a. c. d." But nowhere in the text does he state the locality of the specimen figured, and throughout his text and tables of measurements mentions only skulls from Dauria, Sarepta, and St. Petersburg. In any case his

figures clearly relate to an animal very different from the Vladivostok form here named *E. orientalis*.

35. **Sorex buxtoni**, sp. nov.

BUXTON SHREW.

Type, No. 18655, ♀ ad., July 27, 1901, Gichiga, west coast of Okhotsk Sea, Siberia; N. G. Buxton, Jesup North Pacific Expedition.

Summer pelage.— Above, including sides, dull pale reddish brown; below pale fulvous gray; tail thinly haired, bicolor, dark brown above, below dull gray with a fulvous tinge; ears small, nearly concealed by the fur.

Winter pelage (May specimen).— Above dark reddish brown; sides and underparts silvery whitish gray; tail well clothed, with a distinct pencil at the tip, brown above, clear gray below, darker at the tip, both above and below.

Fall pelage (September and October specimens).— Above dark brown, much darker than in summer pelage; sides and ventral surface gray, more or less tinged on the sides with fulvous,—not pure silvery gray as in spring specimens.

Measurements.— Type: Total length, 106; tail vertebræ, 34; hind foot, 14 mm. Twenty adult males measure as follows: Total length, 100.3 (93–111); tail vertebræ, 34 (31–37); hind foot, 13.8 (12–15). Twenty adult females measure: Total length, 95.6 (90–111); tail vertebræ, 34 (30–38); hind foot, 13.9 (12–15). The average total length of 40 specimens is thus slightly less than 100 mm. Of the 40 specimens, only 8 exceed 100 mm. in total length, and only 8 fall below 95 mm. The skull of the type measures 17 mm. in total length and 8 mm. in greatest width.

This species is represented by 42 skins and skulls and 4 specimens in alcohol, all taken by Mr. Buxton in the vicinity of Gichiga. Both sexes are about equally represented, and also several seasonal phases of pelage. One specimen was taken in January, 1 in April, 7 in July, and the others, except 6 taken Sept. 24–Oct. 6, at intervals between August 25 and September 11. They are thus mostly in summer pelage, with the sides brown like the back. The single May specimen has the sides and underparts clear silvery white, in strong contrast with the dark brown back. In a few specimens taken in September and October the dorsal area is dark brown and the sides gray like the ventral surface, but the gray is dull

and slightly brownish and is confined in most specimens to the lower border of the sides. The greater part of the series is in summer pelage, in which the color of the dorsal area is pale brown, the sides are like the back, and the gray of the ventral surface is dull with a slight tinge of yellowish.

Sorex buxtoni belongs to the *S. araneus* group, but differs from the true *S. araneus* of Sweden and other parts of northern Europe in its much paler colors at all seasons, and smaller size. It more nearly resembles *Sorex pribilofensis* Merriam, from the Pribilof Islands, from which it is almost indistinguishable in coloration in some of its phases.

"Russian local name, *Mysh*, meaning mouse, as the people do not distinguish between the mice, voles, and shrews.

"Abundant in suitable localities all over the Gichiga and Anadyr sections of Siberia, and probably the rest of Northeast Siberia. At Gichiga they prefer the higher places on the tundra where it is moist, and where there is a growth of low hawthorn bushes, or other places where there are shrubs or an undergrowth, as along the banks of streams or of tundra pools. They are active during the entire year and often come into the houses during the winter. They gave me much annoyance during the summer by devouring the mice and voles that had been caught in my traps, and by springing my larger baited traps and escaping unharmed. They were easily caught in traps baited with fresh fish or meat. They are most active during August and September." — N. G. B.

American Affinities of Certain East Siberian Mammals.

The mammal fauna of East Siberia, so far as genera are concerned, consists of exclusively Holarctic types, represented, with one exception (*Moschus*), in both Arctic America and Arctic Eurasia, but by more or less differentiated forms on the two continental areas. Whether some of the more slightly differentiated forms are to be regarded as species or subspecies depends upon the point of view. The results of modern research, however, when based on ample material, demonstrate that what in earlier days were looked upon as

circumpolar species are resolvable into a number of well-marked forms, which occupy definite geographic areas, and are characterized by easily recognized differences. That there is, nevertheless, a close interrelationship between the forms of boreal mammals inhabiting the two continents is beyond question, — a relationship so intimate that it could only have been brought about by a former land bridge connecting the two areas, the existence of which in comparatively recent time, geologically speaking, is generally conceded, if not practically demonstrated.

It is thus probable that most of the more northern types of mammal life on the two continents are the slightly modified descendants of types which formerly had a continuous circumarctic distribution, which have become slowly differentiated, probably mainly since the disruption of the former land connection at Bering Straits. To this category belong the whole of the ursid, canid, felid, and mustelid series (excepting, of course, the mephitine phylum), and such genera as *Cervus*, *Rangifer*, *Paralces*, *Ovis*, and *Ovibos*, and possibly *Bison* among Ruminants, and *Sorex*, *Evotomys*, *Microtus*, *Dicrostonyx*, *Lemmus*, *Sciuropterus*, *Sciurus*, *Eutamias*, *Citellus*, *Arctomys*, *Lepus*, and *Ochotona* among the Insectivores and Rodents. These types are so wide-spread and so diversified on both continents that it is hard to suppose that any of them owe their presence in America to any very recent immigration from Asia, or the reverse. Possibly, however, *Cervus*, *Bison*, and *Eutamias* may have been direct contributions from one continent to the other, the former from Eurasia to America, and the two latter from America to Eurasia, judging by their present relative representation in the two areas.

But the cases especially in point in the present connection are the occurrence along the Siberian and Kamchatkan coasts of types distinctively American. These are a species of weasel (*Putorius pygmæus*) closely related to *Putorius rixosus* of arctic and subarctic America, and only remotely related to any Eurasiatic species; a spermophile (*Citellus buxtoni*) closely related to the *Citellus* (=*Spermophilus* auct.) *parryi* group of boreal America, but only remotely related to any

known Old World type; a shrew (*Sorex buxtoni*) much more nearly related to certain Alaskan forms than to any other; the Kamchatkan Bighorn (*Ovis nivicola*), which is so much more nearly related to the American type of *Ovis* than to any Asiatic species that it was formerly referred to it. The Kamchatkan-Siberian *Evotomys wosnessenskii* is also more nearly related to some of the Alaskan members of the genus than to any of its Old World congeners. *Microtus*, *Arctomys*, *Vulpes*, and apparently *Ursus*, afford nearly parallel cases.

There is thus evidence that eastern Siberia has derived some of its present mammalian life from boreal America, and doubtless within a comparatively recent period. The American origin of various early types that eventually attained circumpolar distribution, as the horse, camel, and rhinoceros phyla, etc., is now well established by palæontological evidence, but that the same is true of some forms of the existing mammalian fauna does not appear to have been heretofore recognized.

(*Continued from 4th page of cover.*)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. December, 1901. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. 1–28. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881–86.....	Price,	$5.00	
" II, 1887–90.....	"	4.75	
" III, 1890–91.....	"	4.00	
" IV, 1892	"	4.00	
" V, 1893	"	4.00	
" VI, 1894	"	4.00	
" VII, 1895	"	4.00	
" VIII, 1896.....	"	4.00	
" IX, 1897.....	"	4.75	
" X, 1898.....	"	4.75	
Volume XI, Part I, 1898,	Price,	1.25	
" " " II, 1899	"	2.00	
" " " III, 1900	"	2.00	
" " " IV, 1901	"	1.75	
" " (Complete).	"	5.00	
" XII, 1899.....	"	4.00	
" XIII, 1900.....	"	4.00	
" XIV, 1900.....	"	4.00	
" XV, Part I, 1901	"	3.00	

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILIÈRLE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

(*Continued on 3d page of cover.*)

Descriptions of New Rodents from Southern Patagonia, with a Note on the Genus Euneomys Coues, and an Addendum to Article IV, on Siberian Mammals.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XIX, Article V, pp. 185–196.

New York, May 9, 1903.

The Knickerbocker Press, New York

Article V. — DESCRIPTIONS OF NEW RODENTS FROM SOUTHERN PATAGONIA, WITH A NOTE ON THE GENUS EUNEOMYS COUES, AND AN ADDENDUM TO ARTICLE IV, ON SIBERIAN MAMMALS.

By J. A. Allen.

In preparing my report on the mammals collected by the Princeton University Expeditions to Patagonia, 1896–1899, under the direction of Mr. J. B. Hatcher, the following additional species [1] have been found which appear to be undescribed. A more detailed account of them, with illustrations, will appear later in the final report on the collection, now nearly ready for publication.

The genus *Ctenomys* is represented in southern Patagonia by at least five well-marked forms, three of which appear to be new. *Reithrodon* and *Euneomys* are each represented by several forms, three of which have not been previously recognized. In working out these species, represented by abundant material, it has been found that *Euneomys* is not very closely related to *Reithrodon*, and equally distinct from *Phyllotis*, when properly restricted.

Ctenomys robustus, sp. nov.

Type, No. 84194, U. S. Nat. Mus., ♂ ad., Rio Chico de Santa Cruz, near the Cordilleras, Feb. 20, 1897; O. A. Peterson.

Pelage soft, short, somewhat lustrous. Above deep yellowish brown, varied with blackish, the hairs being dark slaty plumbeous for the basal two thirds, with a subterminal band of dark rusty yellow, and a very short black tip, with longer blackish-tipped hairs sparsely intermixed; below deep brownish ochraceous; ears dusky brown, barely projecting above the fur; upper surface of fore and hind feet dingy yellowish gray; tail well clothed with fine soft hairs, forming a slight pencil at the tip, yellowish gray, dusky at the tip above.

Other specimens vary from the above in being a little lighter or a little darker, both above and below. Tail variable in color, often wholly without any dusky median line above or any dusky tip; gener-

[1] *Eligmodontia morgani*, based on specimens in the present collection, was described in 1901 (*Cf.* this Bulletin, Vol. XIV, p. 409).

ally there is a very narrow median dusky line, extending from the tip anteriorly for a part or the whole of the length of the tail; in a few specimens it is strongly developed, broadens and increases in blackness towards the tip, and in rare cases the whole tip is black, with a short black stripe on the lower surface on the apical fourth or third of the tail.

Young examples differ from the adults in the general tint being duller and the pelage less lustrous.

Measurements. — Type: Total length, 290; tail vertebræ, 73; hind foot, 40. Nine adult males measure as follows: Total length, 303.5 (290–322, only one above 310, and only two above 298); tail vertebræ, 81.5 (73–88); hind foot, 40.5 (40–42). Five adult females: Total length, 275 (256–300; only one above 280); tail vertebræ, 75 (70–80); hind foot, 37 (35–40).

Skull, type: Total length, 52.5; basal length, 47; zygomatic breadth, 30; interorbital breadth, 10; mastoid breadth, 29.5; length of nasals, 20; palatal length, 25; diastema, 16; upper molar series, 9.6; lower jaw, inner base of incisors to posterior border of condyle, 33; inner base of incisors to tip of angular process, 41; height at condyle, 16; lower molar series, 10.3; distance between condyles, 18; distance between tips of angular processes, 37. Ten adult male skulls: Total length, 53.6 (51–55); zygomatic breadth, 30.5 (29–33). Five adult female skulls: Total length, 48 (46–50); zygomatic breadth, 27.5 (26.2–28.6). The mastoid breadth is practically the same as the zygomatic breadth, varying in different specimens from slightly more to slightly less. The greater part of the skulls in the present series are middle-aged, with all the sutures distinct; only two or three give evidence of being very old.

Represented by 23 specimens, all from the upper Rio Chico, Cordilleras, and all collected by Mr. Peterson, February 7 to 28 (except one taken March 9). All but three are in adult pelage, and these have nearly acquired it, only the lower part of the back and rump retaining the pelage characteristic of immaturity. The general color above of the adults varies from strong yellowish brown to slightly rufescent brown, and below from deep ochraceous buff to brownish ochraceous. The color of the tail is very variable, as already noted; except in the case of a few which have the tail practically uniform yellowish gray, no two have the tail colored alike, in respect to the median dorsal line, which varies from a slight trace of dusky to a well-defined blackish median stripe, the black widening and increasing in intensity apically; in three speci-

mens the whole tip of the tail is black, including the under surface. A few other specimens approach this condition.

As shown by the measurements already given, the females are much smaller than the males.

The skull is very variable in respect to size and many details of structure, but especially in the size and form of the interparietal. In one specimen it is almost obsolete, forming a mere line less than a millimeter in antero-posterior extent and 5 mm. in transverse extent. Generally it is subtriangular, with a transverse width of 5–7 mm. and an antero-posterior length of 2–4 mm. It is sometimes divided medially into two halves. On each side of the interparietal, and separated from it by the posterior extension of the parietals, is an intercalated bone of variable size and of an irregularly oval outline, each generally considerably larger in area than the interparietal.

Ctenomys robustus differs markedly in coloration from *C. magellanicus*, but not very appreciably, so far as specimens of the latter are available for comparison, in size or in cranial characters. *C. magellanicus* is pale yellowish gray, or ash gray with a fulvous tinge, while *C. robustus* is dark yellowish brown. *C. boliviensis* is very much larger and very much darker and redder, having "the general hue bright rufous brown," and the upper surface of the nose, head, and nape blackish. It appears to have no close relationship to any of the other described species of *Ctenomys*.

Ctenomys sericeus, sp. nov.

Type, No. 84191, U. S. Nat. Mus., ♂ ad., Cordilleras, upper Rio Chico de Santa Cruz, Patagonia, Feb. 5, 1897; O. A. Peterson.

Type. — Pelage short, soft, and glossy. General color above yellowish gray strongly varied with black, the hairs being slaty plumbeous for the basal three fourths, then banded narrowly with pale yellowish brown, and tipped with black; flanks and ventral surface buff; sides of nose yellowish brown; top of nose and top of head like median dorsal region, which is darker than the sides; ears very small, blackish; upper surface of feet dingy gray with a slight yellowish cast; tail pale yellowish, with a median dusky stripe along the apical half of the upper surface.

In some specimens there is a tendency to a well-marked darker median dorsal band, extending from the nose to the base of the tail. Several of the specimens are a little darker than the type above described. The tail stripe varies in distinctness from nearly obsolete to a broad, well-defined black band running the whole length of the tail.

Young in first pelage are grayer and with less fulvous, and the pelage is longer, softer, and less firm.

Measurements. — Type: Total length, 208; tail vertebræ, 62; hind foot, 28. Five adult males: Total length, 200 (195–208); tail vertebræ, 56.6 (51–62); hind foot, 26.2 (25–28). A single adult female measures: Total length, 210; tail vertebræ, 60; hind foot, 27.

Skull, type: Total length, 39; basal length, 35.2; zygomatic breadth, 24; mastoid breadth, 23.5; interorbital breadth, 7; length of nasals, 13; palatal length, 17; diastema, 10; upper molar series, 7.5; lower jaw, inner base of incisors to end of angular process, 29.5; height at condyle, 7; width between condyles, 15.3; width between tips of angular processes, 25.6; lower molar series, 8. Four adult male skulls: Total length, 36.4 (34.3–39); zygomatic breadth, 21.5 (20–23.6). An old female skull measures, total length, 36; zygomatic breadth, 20.

In several of the skulls the interparietal is entirely absent, and when present is very small. The lateral intercalated bones are present, and are as variable in form as already described in *Ctenomys robustus*.

Represented by 11 specimens, collected by Mr. Peterson at the eastern edge of the Cordilleras of the upper Rio Chico de Santa Cruz, Jan. 31–Feb. 7, 1897. Six are adults and five are young, partly in juvenile pelage.

This species exceeds only a little in size *Ctenomys pundti* Nehring, but differs from it very markedly in coloration. The total length of the skull of *C. pundti* is given as 31.3, and the zygomatic breadth as 19.5; the same for *sericeus* (average specimens) being, respectively, 36 and 21.5. While it agrees practically in size with *Ctenomys bergi* Thomas, from the central part of the Province of Cordova, it differs greatly from it in color, being much darker throughout.

Ctenomys colburni, sp. nov.

Type, No. 147, Colburn Coll., ♂ ad., Arroyo Aike, in the basalt cañons, 50 miles southeast of Lake Buenos Ayres, Patagonia, April 19, 1898; A. E. Colburn, after whom the form is named.

Similar to *C. sericeus* but larger, much more strongly suffused with fulvous, and less varied with black.

Measurements. — Type: Total length, 230; tail vertebræ, 65; hind foot, 29. Fifteen males measure as follows: Total length, 224.5 (210–240, with one 245 and one 250); tail vertebræ, 69 (60–75, with two at 80); hind foot, 30 (28–32, and one 33). Seventeen females: Total length, 213 (200–225); tail vertebræ, 62.2 (60–65); hind foot, 29.5 (29–31).

Skull. — Type, total length, 43; basal length, 39; zygomatic breadth, 25; mastoid breadth, 25; interorbital breadth, 8.5; length of nasals, 14.3; palatal length, 20; diastema, 6; upper molar teeth, 8; lower jaw, inner base of incisors to posterior border of condyles, 28.5; inner base of incisors to point of angular process, 33.5; height at condyle, 8; width between condyles, 16; width between points of angular processes, 27; lower molar teeth, 8.5. Seven old male skulls measure: Total length, 43 (41–45); zygomatic breadth, 24.3 (23.5–25.3). Fifteen old female skulls: Total length, 38 (36–41); zygomatic breadth, 22.2 (21–24).

Represented by 33 specimens — 16 males and 17 females — all adult except 3, and all collected by Mr. Colburn, of which 16 were taken in the basalt cañons south of Lake Buenos Ayres, April 2 to May 15, and 17 near Swan Lake. Aside from the young specimens, which are grayer and much less fulvous than the adults, the variation in color consists in some specimens being a little more strongly suffused with yellowish than others, and in the distinctness of the tail stripe, which is often wholly wanting, or present in varying degrees, from a faint trace to a broad black stripe.

This species is intermediate in size between *C. sericeus* and *C. mendocina*, being larger than the former, and differing from it in its more strongly fulvous and generally lighter coloration, and from the latter in considerably smaller size and entire absence of any reddish suffusion.

Oxymycterus microtis, sp. nov.

Type, No. 84234, U. S. Nat. Mus., ♂ ad., Pacific slope of the Cordilleras, near the head of the Rio Chico de Santa Cruz, March 7, 1897; O. A. Peterson.

Adult male (type), March. — Pelage thick, short, and fine, almost mole-like in character. Pelage and general color almost exactly as in *Oxymycterus lanosus* Thomas, but twice the size of that species,

with the tail one half shorter and fore claws large, fossorial. Above dark yellowish brown; underparts whitish gray, the plumbeous under fur tinging the otherwise whitish surface; top and sides of nose dark grayish brown, without any tinge of yellow or rufous; ears very small, scarcely reaching the surface of the short fur, concolorous with the enclosing fur; tail very short, but little exceeding the length of the hind foot, very thickly clothed, dark brown, only slightly lighter below than above; upper surface of the feet grayish brown, the toes lighter, yellowish white; soles naked, dark flesh-color.

A second specimen is exactly similar in coloration, except that the ventral surface has a slight wash of buff, apparently due to staining.

Measurements. — Total length (type), 138; tail vertebræ, 28; hind foot, 21; longest fore claw, 6. *Skull*, total length, 27.6; basal length, 23.6; zygomatic breadth, 12.5; width of brain case, 12; interorbital breadth, 5; length of nasals, 10.5; palatal length, 10; palatal foramina, 5; diastema, 6.3; upper molar series, 3.5; length of lower jaw (inner base of incisors to posterior border of condyle), 15; height at condyle, 5.5; lower molar series, 3.4.

Represented by two specimens — a skin and skull, and a skin and skeleton — collected on the Pacific slope of the Cordilleras, at the head of the Rio Chico de Santa Cruz.

Externally *Oxymycterus microtis* is a miniature of *Akodon macronyx* with a relatively much shorter tail. It exactly resembles in coloration above and in the texture of the pelage *Oxymycterus lanosus*, but the latter has whiter under parts, is very much smaller, has a much longer tail, and small, non-fossorial claws; but the skulls of the two are very similar in general contour, differing only in size and slightly in details. *O. microtis* thus combines the large fossorial claws of the *Akodon macronyx* group with the cranial characters and weak dentition of the *O. lanosus* type. The narrow line separating *Akodon* and *Oxymycterus* is thus still further narrowed by the present annectent link.

Reithrodon cuniculoides obscurus, subsp. nov.

Type, No. 3, Colburn Coll., ♂ ad., Punta Arenas, Patagonia, Jan. 1, 1898; A. E. Colburn.

Similar to *Reithrodon cuniculoides*, but darker throughout, the upper parts dark brown, varied with black-tipped hairs and suffused with fulvous, the sides yellowish, and the ventral surface brownish ochraceous; inner side of thighs and anal region whitish; top of head

blackish, slightly varied with buff-tipped hairs; sides of nose and cheeks brownish ochraceous like the ventral surface; ears very thinly haired, brown externally, brownish buff internally, with a deep ochraceous buff post-auricular patch; upper surface of feet clear white; tail blackish above along median line, sides and below grayish white.

Measurements (of type, from dry skin). — Total length, 195; head and body, 130; tail, 65; hind foot, 34. (The tail seems to have lost a small portion of the tip.) Skull (imperfect), length of nasals, 15.5; palatal length, 18; palatal foramina, 10; diastema, 9.5; upper molar series, 6.

Unfortunately represented by only the type specimen, which has no flesh measurements. The skull shows the specimen to be fully adult, and larger than any skull in the large series of *R. cuniculoides*. It is characterized by its strong, dark coloration, between which and the darkest, most-deeply colored specimen in a series of 28 examples from the coast region and the interior plains, there is a striking contrast through the greater depth and intensity of all the tints. Considering the climatic conditions of the two regions,— the moist, forested country of the Punta Arenas district, and the open, arid plains of the coast and interior — the differences here shown in the coloration of the two phases conform to what would be expected to result from such diverse physical conditions. The differences are certainly not to be accounted for by season or age. It finds an exact parallel in the cases of *Akodon xanthorhinus* as compared with *A. canescens*, and *A. michaelseni* as compared with *A. macronyx*.

Reithrodon hatcheri, sp. nov.

Type, No. 84210, U. S. Nat. Mus., ♂ ad., Pacific slope of the Cordilleras, head of the Rio Chico de Santa Cruz, March 11, 1897; O. A. Peterson. Named in honor of Mr. J. B. Hatcher, Director of the Princeton Patagonia Expeditions.

Similar in size and proportions to *R. cuniculoides*, but much darker, and with much less fulvous suffusion.

Adult male (type), March. — Above dark grayish brown, varied with black-tipped hairs, faintly suffused with grayish fulvous; sides paler, passing gradually into the pale buff of the ventral surface; sides of nose, lower border of cheeks, lower border of flanks, and whole ventral surface cream-buff, except inside of thighs and adjoining portion of ventral surface; ears rather thinly haired, externally dull

brown, internally yellowish buff, the hairs at the anterior base of the ears whitish and the post-auricular patch pale buff; upper surface of the feet white; soles of hind feet to base of toes densely haired, dark brown, toes flesh-color; tail with a narrow brown stripe above, sides and below dull whitish.

Measurements. — Type: Total length, 230; tail vertebræ, 78; hind foot, 34. Seven specimens (4 males and 3 females) measure: Total length, 215 (200–230); tail vertebræ, 77 (75–82); hind foot, 33.3 (32–35). *Skull* (type).—Total length, 35.7; basal length, 31; zygomatic breadth, 20.5; interorbital breadth, 4; length of nasals, 16; palatal length, 17.5; palatal foramina, 9; diastema, 8.5; upper molar series, 6.4.

Represented by 10 specimens, all collected by Mr. Peterson in the Cordilleras at the head of the Rio Chico de Santa Cruz, and all but one (the type, taken March 11) between February 4 and 21, 1897. Part of the specimens, including the type, are in the dress of the breeding season, while others have partly or wholly acquired the post-breeding dress. These have a stronger suffusion of yellowish buff on the sides and ventral surface, but are otherwise similar to the type. A quarter grown young example is similar in general coloration to the adults, except that the ears have the external surface blackish and the internal surface deep buff, with the hairs at the anterior base of the ears and the post-auricular patch also deep buff, in prominent contrast with the surrounding pelage, as is not the case in the adults.

Reithrodon hatcheri is readily distinguishable from *R. cuniculoides* by its much darker and less fulvous coloration, the contrast in color between the two series being conspicuously noticeable. There are apparently no cranial differences of importance.

Euneomys petersoni, sp. nov.

Type, No. 84198, U. S. Nat. Mus., ♀ ad., upper Rio Chico de Santa Cruz, near the Cordilleras, Patagonia, Feb. 10, 1897; O. A. Peterson, for whom the species is named, in recognition of his important field work on the mammals of Patagonia.

Similar in coloration to *Phyllotis xanthopygus*, but very much smaller, with a relatively very short tail and naked soles, but the upper incisors are as strongly grooved as in *Reithrodon cuniculoides*.

Adult (type), February. — Pelage very long and soft, almost woolly. Above dark gray-brown, varied with blackish and fulvous, the pelage

being plumbeous black for the basal four fifths, with an apical band of brownish fulvous, and many longer black hairs intermixed; sides much paler and more fulvous, the fulvous increasing in intensity along the lower border; ventral surface soiled white, the fur being basally very dark plumbeous and broadly tipped with yellowish white; ears dark brown on both surfaces and very thinly haired, the surrounding fur concolorous with that of the anterior dorsal surface; sides of nose and lower border of cheeks whitish gray with a faint tinge of yellowish; soles naked except the posterior third, dark flesh-color; upper surface of fore and hind feet pale flesh-color, nearly white; tail one third or less than one third of the total length, well clothed, dusky brown above, sides and below white.

Measurements. — Total length, 175; tail vertebræ, 60; hind foot, 26. Three other specimens (young adults) measure: Total length 160 (150–165); tail vertebræ, 57 (50–60); hind foot, 25 (25–25).

Skull. — Long and narrow, the interorbital and rostral portions especially elongated; post-palatal fossa narrow and v-shaped, but not quite so narrow and pointed in front as in *Reithrodon cuniculoides;* front border of zygomatic plate as in *Phyllotis, Oryzomys*, etc., lacking the pointed superior process seen in *Reithrodon* and *Sigmodon;* bullæ small and pointed, as in *Phyllotis;* upper incisors deeply grooved; molars brachyodont as in *Phyllotis*, but very broad and heavy, — not hypsodont as in true *Reithrodon;* lower jaw short and heavy to support the thickened molars; posterior end of lower incisor encapsuled, forming a prominent process on the outer sides at the base of the condyloid process. Dimensions (type): Total length, 30.5; basal length, 26.5; zygomatic breadth, 17.5; interorbital breadth, 3.5; width of brain case, 14; length of nasals, 14; palatal length, 14.5; palatal foramina, 8; diastema, 8.5; upper molar series, 5.2; width of first molar, 1.8; lower jaw, length (inner base of incisors to posterior border of condyle), 18; height at condyle, 15; lower molar series, 5.5.

Represented by four specimens, an adult female that had suckled young, and three younger specimens, nearly adult, all taken by Mr. Peterson in the Cordilleras at the head of the Rio Chico de Santa Cruz, Feb. 8–14, 1897. These specimens are all quite similar in coloration, except that the younger ones are grayer than the adults, with much less fulvous suffusion and with very little fulvous on the flanks and ventral surface.

This species finds its nearest ally in *Euneomys chinchilloides* (Waterhouse), known thus far only from Tierra del Fuego, which it apparently closely resembles in size and coloration.

Note on the Genus *Euneomys* Coues.

Waterhouse, in founding the genus *Reithrodon* (P. Z. S., 1837, p. 29), included in it two species, *R. typicus* and *R. cuniculoides*, which appear to be strictly congeneric. In the 'Zoölogy of the Voyage of the Beagle' (Mammalia, Part II, 1839, p. 72), he added as a third species, *R. chinchilloides*, and gave figures of *R. cuniculoides* and *R. chinchilloides*, including the external characters and the skull and teeth of each, and the lower molar teeth of *R. typicus*. In 1874, Dr. Coues (Proc. Acad. Nat. Sci. Phila., 1874, p. 185), and later in 'Monographs of North American Rodentia' (1877, pp. 118, 119), from a study of Waterhouse's figures, divided the genus *Reithrodon* into two groups, to which he gave the rank of subgenera, making *R. cuniculoides* the type of the restricted group *Reithrodon*, and *R. chinchilloides* the type and only species of his "subgenus" *Euneomys*, giving very clearly some of the principal differential characters of the two groups. The more important of these are: (1) "Anterior root of zygoma deeply emarginated in front" in *Reithrodon* and "about straight in front" in *Euneomys;* (2) "palate ending much behind the molar series, and showing a median ridge intervening between lateral paired deep excavations" in *Reithrodon*, and "palate ending nearly opposite the last molars, slightly ridged or excavated" in *Euneomys;* (3) "pterygoid fossæ deeply excavated, and the bones very closely approximated" in *Reithrodon*, and "pterygoid fossæ shallow and these bones less approximate" in *Euneomys;* (4) "condyloid process of lower jaw concave internally" in *Reithrodon*, and "condyloid process of the lower jaw flat internally" in *Euneomys;* (5) "coronoid process slender, very oblique" in *Reithrodon*, and "coronoid process very broad, nearly vertical" in *Euneomys*. To these may be added (6) the very different enamel pattern of the molar teeth in the two groups, in *Reithrodon* the folds being transverse with the outer and inner loops alternating, and in *Euneomys* oblique, with one less fold in each of the last two upper teeth, and in the first two lower teeth, — a very radical difference in tooth structure, which alone warrants the generic separa-

tion of the two groups. As Waterhouse figured the crown surface of the teeth in only *R. cuniculoides*, this most important difference of all necessarily escaped Coues's attention.

In both these genera — *Reithrodon* and *Euneomys* — the tooth structure is remarkably distinctive for genera of Muridæ, and, as compared with each other, presents almost the extremes of unlikeness. But a further noteworthy difference (7) is seen in a pair of depressions on the posterior third of the palatal surface in *Euneomys*, which are absent in *Reithrodon* and in all of the allied genera.

A comparison of *Euneomys* with "*Reithrodon*" *pictus* shows that there is only the superficial and purely incidental resemblance of the grooved upper incisors, which, however, are only slightly sulcate in *R. pictus*, *Phyllotis bolivianus*, and their allies, and deeply sulcate in *Euneomys*. In all essential respects *Reithrodon pictus* is a *Phyllotis*, but sufficiently aberrant, perhaps, to warrant its subgeneric separation; but its relationship appears not to be with *Euneomys*, as has been assumed (*cf.* Thomas, Ann. and Mag. Nat. Hist. (7), VIII, 1901, p. 254).

ADDENDUM TO ARTICLE IV, ON SIBERIAN MAMMALS.

At the time of preparing my report on the mammals collected in northeastern Siberia by the Jesup North Pacific Expedition, a series of 9 Arctic Foxes (*Vulpes lagopus*) in summer coat, purchased by Mr. W. Bogoras at Mariinski Post (mouth of Anadyr River), had been mislaid and were overlooked. They have since been found and seem worthy of record.

These specimens show that the summer coat presents two phases, a light and a dark phase. Four of the specimens represent the dark phase, three the light phase, two are intermediate (one approaching the light phase and one nearer the dark phase), and one, the most interesting of all, in moult, showing the process of change from winter to summer dress. *Dark phase:* Whole dorsal area dark, almost blackish brown, passing into light yellowish brown on the flanks, and still lighter yellowish brown on the ventral surface. This is the color of the longer overhair; the woolly underfur is dark grayish brown over

the median dorsal area, lighter or gray on the sides, and light gray on the ventral area. *Light phase:* Whole dorsal area with the longer hairs grayish brown, sides and ventral surface lighter, with the underfur light gray or grayish white. The general effect over the dorsal area is dark gray, instead of dark brown as in the dark phase. The specimen in moult has the whole head, limbs, and posterior third of the back dark seal brown, and the pelage very short; the rest of the body is still in the long pure white winter coat, but on parting the dense winter pelage a blanket of short brown fur and hair is found sprouting beneath the winter coat, these short brown hairs being longest and most abundant near the junction of the areas covered respectively by the summer and winter coats.

I also take this opportunity to correct an error in my account of the Kamchatka Bighorn (*antea*, p. 130). Since the distribution of my paper on Siberian Mammals Mr. Lydekker has called my attention to his paper, 'The Wild Sheep of the Upper Ili and Yana Valleys,' (P. Z. S., 1902, pp. 80–85, pll. vii and viii), which I (most inexcusably) overlooked in writing of the Kamchatka Bighorn. Apparently my specimens are referable to *Ovis borealis* Severtzoff, since they agree with Mr. Lydekker's description and colored figure of this species (*l. c.*), although its type loclity is about a thousand miles to the westward of the Taiganose Peninsula, where my specimens were collected. I called attention to the differences in coloration between my specimens and the description and figure of *O. nivicola* as given by Lydekker in 'Wild Oxen, Sheep, and Goats of All Lands,' and deeming it improbable that two species of sheep would be found so near each other as the Taiganose Peninsula and the points in the neighboring parts of Kamchatka where *O. nivicola* is known to occur (indeed, Lydekker, in the work last cited, p. 224, gives the range of *O. nivicola* as "typically the countries forming the northern shores of the Sea of Okhotsk, namely the peninsula of Kamschatka on the east and the Stanovoi Mountains on the west," etc., thus including the Taiganose Peninsula), I ventured to criticise the coloring of the head given in Lydekker's figure. It now appears that the criticism was unwarranted, and that there are two species of *Ovis* living about the head of the Okhotsk Sea. For the present, therefore, I am content to refer my Taiganose specimens to *O. borealis* rather than to *O. nivicola*, with some suspicion, however, that they will not prove subspecifically the same as the *O. borealis* of the Yana River regoin, nearly one thousand miles to the northwestward of the Okhotsk Sea. I certainly do not agree with Mr. Lydekker in referring any of Siberian sheep to *Ovis canadensis* of North America, even as subspecies.

(*Continued from 4th page of cover.*)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. December, 1901. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. 1–28. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume	I, 1881–86.....	Price, $5.00	Volume	XI, Part I, 1898,	Price, 1.25
"	II, 1887–90.....	" 4.75	"	" " II, 1899	" 2.00
"	III, 1890–91.....	" 4.00	"	" " III, 1900	" 2.00
"	IV, 1892	" 4.00	"	" " IV, 1901	" 1.75
"	V, 1893	" 4.00	"	" (Complete).	" 5.00
"	VI, 1894	" 4.00	"	XII, 1899.....	" 4.00
"	VII, 1895	" 4.00	"	XIII, 1900.....	" 4.00
"	VIII, 1896.....	" 4.00	"	XIV, 1900.....	" 4.00
"	IX, 1897.....	" 4.75	"	XV, Part I, 1901	" 3.00
"	X, 1898.....	" 4.75			

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILIÈRLE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

(*Continued on 3d page of cover.*)

Mammals Collected in Alaska and Northern British Columbia by the Andrew J. Stone Expedition of 1902.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XIX, Article XXI, pp. 521–567.

New York, October 10, 1903.

LIBRARY OF THE UNIVERSITY

The Knickerbocker Press, New York

Article XXI. — MAMMALS COLLECTED IN ALASKA AND NORTHERN BRITISH COLUMBIA BY THE ANDREW J. STONE EXPEDITION OF 1902.

By J. A. Allen.

The collection of mammals obtained by the Andrew J. Stone Expedition [1] of 1902 numbers nearly 1100 specimens, representing 43 species and subspecies, some of them by very large series; it includes about 50 head of large game, and a series of 31 skulls of the Kadiak Bear. In completeness, for the area principally worked, and in the quality of the material obtained, the results merit the highest praise. The field of operation was mainly in the Cassiar District of northern British Columbia, as shown by the following brief statement of the itinerary.

Mr. Stone left New York April 5, to outfit at Seattle, Washington. He left Seattle April 25, via Juneau, for Sand Point, Alaska, where he arrived May 12. From Sand Point an expedition was made to the Stevana flats, seventy-five miles inland, for the purpose of procuring specimens of the big brown bear (*Ursus merriami* of the Stone Expedition report for 1901[2]) discovered by him in 1901, and incidentally to obtain accessories for a group of the Grant Caribou, also discovered by him in 1901.[3] While successful in this last particular, the month's hunt for bears proved futile, only three bears being seen and none obtained. The reason for this failure is thus stated in Mr. Stone's report on the season's work: "All the large bears of western Alaska are rapidly becoming exterminated. Most of the country inhabited by them is easy of access, and in many places the cover is very slight for such large animals. There is every evidence that they were once very plentiful on Stevana flats and in the mountains surrounding the flats. Well-worn, but old trails are numerous, and reports of large numbers being killed there

[1] For an account of the origin, maintenance, and proposed work of the Andrew J. Stone Expedition see this Bulletin, Vol. XVI, 1902, p. 125.
[2] See this Bulletin, Vol. XVI, 1902, pp. 141, 227.
[3] *L. c.*, pp. 119–127.

some years previous are still current. A single hunter is reported to have killed forty-five animals in one season's hunt. But, as in many other places in the best game countries, it is this sort of thing that is making animal life scarce."

On his return from the North he reached Juneau on June 26, and arrived at Wrangel the following day. Here he found Mr. M. P. Anderson, his assistant, already at work collecting small mammals. The party left on July 8 for the headwaters of the Stickine River, in which general region collecting was carried on till October 23. The party then returned to the coast, and two weeks were spent on Kupreanof Island, collecting deer and small mammals.

Work in the interior was begun at Telegraph (village), July 10, and continued there until August 18, with a side trip into the Cheonnee Mountains, to the south of Telegraph Creek, and others to the 'Summit,' twelve miles north of Telegraph. The country about Telegraph is described by Mr. Anderson, in his MS. report, as broken, the river, below the village, flowing between terraced hills, which gradually rise toward the mountains. "The terraces, sometimes three in number, are composed of drift, and are broken and irregular. Above the village the walls of the river become more precipitous, and there are frequent basaltic cliffs, with taluses sloping to the water's edge. Back of the village, on each side of the creek, rise cliffs with talus piles, and above these other terraces, level bottoms, and flat-topped hills. Wherever rock appears in place it is lava." The timber consists of 'black pine,' a spruce, two species of juniper, growing in low patches on the dry hillsides, poplars and a few birches. Raspberries were abundant everywhere, sabis berries on the hillsides, and gooseberries, strawberries and currants were more or less plentiful in suitable places.

No attempt was made here to collect large mammals, but about 650 small mammals were obtained during the stay at Telegraph Creek, including those taken on the side trips to the Cheonnee Mountains and the 'Summit,' at the head of Telegraph Creek.

Mr. Stone, with his three assistants, and four animals carry-

ing the camp outfit and supplies, left Telegraph Creek August 16, reaching Shesley, a Government telegraph station, on the headwaters of Shesley River, forty-five miles distant, on the 19th. A part of the supplies were left here and a trip made into the Shesley Mountains, for large game. Four Mountain Goats were killed *en route*, but fell into inaccessible places and were lost. "On the afternoon of August 22," continues Mr. Stone in his MS. report, "camp was pitched among some low balsams, just at the upper edge of timber-line, after having travelled a swampy mountain plain all day. Confronting us in every direction were very rugged mountains, cut by deep cañons. To secure goats and sheep was the special object of this hunt, but after the first three sheep were taken I decided that the coat was yet too short for mountable specimens, and did not try for any more. Four splendid specimens of goats were secured, one Black Bear and a Grizzly mother and her cub." Also about 140 small mammals were taken on the Shesley trip.

The camp at the head of Shesley River is described by Mr. Anderson as "situated at timber-line on the side of a mountain, which, rising above us, formed a plateau barren of vegetation, except for a few lichens and here and there a little bunch grass. The side where we were camped, however, had considerable grass where there were depressions that gathered moisture or where little streams ran. Below us on the side away from the plateau ran a considerable glacier stream in a deep cañon. Between the plateau and the high snow-covered mountains from which this stream ran, there was a broad valley through which flowed another glacier stream to join the first. The valley was broken into innumerable hills and knolls, among which were small lakes. The timber here consisted of scrubby balsam fir, with here and there a pine. Willows and other shrubs were abundant in the broad valley, but the ground was largely covered with mosses and lichens, and bunch grass grew in the dry places."

The party later returned to Shesley, and on September 6 started for Level Mountain, some fifty miles further on, and about one hundred miles southeast of Telegraph Creek. At

Level Mountain 5 Moose, including an adult female with twin calves, 9 Caribou, and 1 Red Fox, and about 100 small mammals were secured. On the return trip Telegraph Creek was reached September 27. From this point a trip was made to Iskoot Summit, distant about forty-five miles, for the purpose of making a collection of the Stone Sheep, first discovered by Mr. Stone in the Cheonnee Mountains, in August, 1896. Six sheep were secured, consisting of two old females, a three-year-old ram and several lambs. A second trip was made to the Cheonnee Mountains during the third week of October, in the hope of securing some large rams, but the weather turning cold, with heavy snow-falls, the trip proved dangerous and unsuccessful.

The final departure from Telegraph Creek for Wrangel was made on the 23d of October, and later, as already stated, nearly two weeks were devoted to collecting on Kupreanof Island.

From the foregoing it will be seen that quite diverse localities were covered, as regards elevation and other conditions, so that a thoroughly representative collection was made in the region of the headwaters of the Stickine River, and from Wrangel and Kupreanof Islands. The species obtained are, arranged by localities, as follows:

Alaska Peninsula.

Phoca richardii pribilofensis.
Ursus middendorffi.
Gulo luscus.

Wrangel and Kupreanof Islands.

Odocoileus columbianus sitkensis.
Sciurus hudsonicus vancouverensis.
Citellus stonei, sp. nov.
Peromyscus sitkensis.
Evotomys wrangeli.
Microtus macrurus.
Ursus sitkensis.
Sorex personatus streatori.
" longicauda.

Telegraph Creek Region.

Rangifer osborni.
Paralces gigas.
Ovis stonei.
Oreamnos montanus.
Sciurus hudsonicus baileyi.
Eutamias caniceps.
Citellus erythrogluteius.
Marmotta caligata.
Mus musculus.
Peromyscus arcticus.
" oreas.
Neotoma cinerea saxamans.
Evotomys dawsoni.
Microtus mordax vellerosus.
" drummondi.

Telegraph Creek Region.
(*Continued.*)

Fiber spatulatus.
Phenacomys constablei.
Synaptomys andersoni, sp. nov.
Lemmus helvolus.
Zapus saltator.
Erethizon epizanthus nigrescens, subsp. nov.
Lepus saliens.
Canis occidentalis.
Vulpes alascensis abietorum.
Ursus horribilis.
" americanus.
Putorius cicognanii richardsoni.
" microtis, sp. nov.
Sorex personatus.
" obscurus.
" palustris alaskanus.

It will be seen from the above that none of the species or subspecies is common to both the Sitkan coast and the Telegraph Creek region.

In regard to the personnel of the Expedition, Mr. Stone had with him as field assistants Mr. Malcom P. Anderson, a student of Stanford University, who was engaged especially to take charge of the work of collecting small mammals; Mr. Belmore H. Browne, of Tacoma, Washington, as general field assistant; and Dennis, a Tahltan Indian, who did good service as a hunter and trapper. Mr. Stone speaks in the highest terms of their efficiency and faithfulness. While Mr. Stone is personally to be credited with the capture and preservation of the large game, he also assisted whenever possible in the small mammal collecting, with a view to securing as large and as varied a collection as possible. All the specimens were carefully measured in the flesh before skinning, and the measurements, especially in the case of the large series of small mammals, bear internal evidence of the care with which they were taken and recorded.

A type-written report of the season's work was submitted by both Mr. Stone and Mr. Anderson, the latter's relating especially to the small mammals and the character of the localities at which they were collected. These reports have been extensively drawn upon in the foregoing introduction, and many of Mr. Anderson's field notes will be found quoted in the following annotated list of the species.

The only special faunal paper bearing upon the mammals of the Telegraph Creek region is a short report on the collection made by Mr. Stone in 1897–98 (this Bulletin, Vol. XII, 1899,

pp. 1–9); but Mr. Wilfred H. Osgood's 'Results of a Biological Reconnoissance of the Yukon River Region' (N. Am. Fauna, No. 19, October, 1900, pp. 1–45) is of special interest in this connection, since he made collections in the Lynn Canal and White Pass districts, not far to the northwestward of Telegraph Creek, and from which he described a number of new species and subspecies represented in the present collections.

In this connection I wish to express my great indebtedness to Dr. A. K. Fisher, Acting Chief of the Biological Survey, U. S. Department of Agriculture, for the loan of topotypes of Mr. Osgood's species and other needed material for use in the preparation of the present paper.

1. **Rangifer osborni** *Allen.* Osborn Caribou.

Rangifer osborni Allen, Bull. Am. Mus. Nat. Hist., XVI, 1902, 140. April 16, 1902. Cassiar Mountains, B. C.

Represented by a series of 9 fine specimens, skins and skulls, carefully prepared for mounting, consisting of 6 males and 3 females, taken on Level Mountain, September 14. The females and four of the males are fully adult, and measure in the flesh as follows: 4 males, total length, 2112 (2048–2211); tail, 191 (178–203); hind foot, 619 (597–635); height at shoulders, 1400 (1334–1499). The 3 females: Total length, 1545 (1473–1651); tail, 174 (165–178); hind foot, 571 (559–600); height at shoulders, 1051 (967–1119).

The general color above is blackish brown, or dark clove brown, the dark color of the back extending to the base of the tail; chest, flanks, and front of legs black; belly white; neck dingy brownish gray, with a white median band in front from the throat to the chest, well developed in some of the specimens and rather indistinct in others; head and face blackish brown, like the back. The antlers in the older males are strikingly large and fine, nearly equalling in size those of the Wapiti Deer.

2. Paralces gigas (*Miller*). Alaska Moose.

Alces gigas Miller, Proc. Biol. Soc. Wash., XIII, May 29, 1899, 57. Tustumena Lake, Kenai Peninsula, Alaska.

Six specimens, collected as follows: An adult female, Shesley Mountains, August 24; an adult female and her twin calves, and two young adult males, Level Mountain, September 10–18, all carefully prepared for mounting.

These specimens are very dark colored, being nearly black and hence much darker than the eastern Moose from northern Maine and New Brunswick. The two young adult males have small antlers, but mature dentition, although the teeth are still unworn. The measurements of these specimens, taken in the flesh before skinning, are as follows:

Mus. No.	Sex.	Total length.	Tail vertebræ.	Hind foot.	Height at shoulder.
19802	♂	2540	178	825	1839
19803	♂	2540	178	825	1814
19798	♀	2540	203	775	1778
19799 [1]	♀	2375	191	787	1814
19801	♂ juv.	1698	102	641	1320
19800	♀ "	1651	102	635	1308

The skulls of the two females (adult but not old, the teeth being but very little worn) measure as follows: Total length, 587, 578; basal length, 560, 543; naso-occipital length, 353, 348; front border of premaxillæ to front end of nasals, 260, 250; length of nasals, 108, 102; zygomatic breadth, 191, 200; mastoid breadth, 141, 152; breadth at fronto-parietal suture (= postorbital construction), 92, 89; length of upper toothrow, 147, 142; length of lower jaw, 450, 457; height at condyle, 157, 146; height at coronoid, 215, 217; lower toothrow, 155, 150. The skull of a young male, with complete but unworn dentition, is intermediate in measurements between the two females, while another young male skull of practically the same age is slightly larger than the larger of the two females.

[1] Mother of Nos. 19800 and 19801, twins, about six months old.

These specimens are much larger than specimens of the eastern animal of corresponding age, and in their dark coloration resemble Kenai Peninsula specimens, to which they are provisionally referred.

3. **Odocoileus columbianus sitkensis** *Merriam.* Sitka Deer.

Odocoileus columbianus sitkensis Merriam, Proc. Biol. Soc. Wash., XII, 1898, 100, April 30, 1898. Sitka, Alaska.

Fourteen specimens, all in fine condition for mounting, collected on Kupreanof Island, southeastern Alaska, November 3–14. The series contains adults of both sexes, several young males, and a young-of-the-year female.

The type, from Sitka, Alaska, was an immature female, killed August 6, and had "patches of gray winter coat." As the present specimens, all killed during the first half of November, are in practically full winter coat, the following description, based on this material, is appended.

Adult Male (November). — General color, pale yellowish brown with a slight grayish cast, darker along the median line of the back and lighter on the flanks; the hairs individually are basally light ash gray, broadly ringed near the tip with blackish and strongly tipped with deep buff; nose with a broad terminal band of black, laterally not quite reaching the lips; face whitish gray as far back laterally as the eyes, which are nearly enclosed in this light area, behind which is a broad V-shaped band of black, beginning anteriorly considerably in front of the plane of the eyes, and extending backward about midway between the posterior border of the eyes and the base of the horns, and blending on top of the head with a blackish area varied with rusty brown (deepening in some specimens to chestnut); cheeks pale buffy gray; neck all round and chest like back; chin white, followed by a band of pale yellowish brown; a patch of black on either side of the lower jaw about midway between the tip of the chin and the angle of the mouth, varying in extent and sharpness in different specimens; throat and upper part of neck in front white, followed by a broad band of brown, and this again by an indistinct half-collar of grayish white; pectoral region darker than the back, in some specimens quite blackish; axillary region and inside of fore legs white, the white on the legs becoming buffy white distally; outside of upper part of fore legs like the flanks, the legs becoming paler and yellower distally, passing into ochraceous on the feet; middle of belly, inguinal region

and inside of hind legs white, the white on the legs decreasing in width distally and terminating a little below the tarsal joint; outside of hind legs proximally like the body, becoming ochraceous brown below the tarsal joint and deepening in color distally to deep ochraceous on the feet; tarsal gland dark rusty brown or dull chestnut, usually with a blackish tinge; ears externally gray, passing into pale buff basally, and white internally, with a slight fringe of buff; tail above at base like the rump, passing gradually into black, which occupies from about one-half to two-thirds its length; lower side of tail white, the white also forming a terminal fringe visible from above. Antlers dark reddish brown; they are small, but very symmetrical and handsome in the old males.

The foregoing is based on a middle-aged male in prime condition, but the coloration in the series of fourteen specimens, including females and young males, is so uniform that the variations are hardly worth noting, and are fairly covered by the qualifications above expressed. They relate mainly to the distinctness of the black face and chin marks, the extent of the black area on the tail, the intensity of the fulvous tints on the legs, and the dusky shading on the pectoral area, which is sometimes quite blackish. In the adult males there is also very little variation in size, either in external measurements or in the skulls, as shown by the following:

External measurements of 3 adult males: Total length, 1508 (1500–1524); tail vertebræ, 127 (127–127); hind foot, 436 (432–438); height at shoulders, 902 (889–908). A fourth adult male measures slightly smaller. The two adult females are much smaller, except that the tail is much longer, as follows, respectively: Total length, 1321, 1283; tail vertebræ, 165, 165; hind foot, 406, 406; height at shoulders, 835, 762. The ear from the notch, as well as can be determined from the skins, varies from about 115 to 125.

Skull measurements of 3 adult males: Total length, 266 (265, 266, 266); basal length, 254 (253, 254, 255); naso-occipital length, 215 (211, 216, 218); front border of premaxillæ to front end of nasals, 64 (65, 65, 63); length of nasals, 77.3 (73, 76, 83); zygomatic breadth, 112 (112, 112, 112); breadth of braincase at fronto-parietal suture (= post-orbital constriction), 73 (74, 73, 72); mastoid breadth, 97 (95,

100, 95); length of upper toothrow, 69 (68, 69, 69); length of lower jaw, 202 (198, 201, 208); height at condyles, 75 (75, 75, 75); height at coronoid process, 109 (110, 110, 107); length of lower toothrow, 72 (72, 72, 72); antlers: length of main beam, following external curvature, 336 (285, 352, 370); distance between points of main beam, 303 (260, 320, 330); across point of greatest convexity of main beams, outside to outside, 393 (387, 385, 408). The specimen with the smallest antlers is the oldest of the three, or at least has the teeth most worn.

4. **Ovis stonei** *Allen.* Stone Sheep.

Ovis stonei Allen, Bull. Am. Mus. Nat. Hist., IX, 1897, 111. April 8, 1897. Head of Stickine River, B. C.

Ovis canadensis liardensis Lydekker, Wild Oxen, Sheep, and Goats, 1898, 215, fig. 41. Liard River, lat. 59° N.

Nine specimens, collected as follows: Shesley Mountains, 3, August 24; Iskoot Summit, 6, October 4–10. They are mostly young adults, but include one quite young lamb, three old females, and a three-year-old male. The flesh measurements of the three adult females are: Total length, 1359 (1321–1410); tail vertebræ, 110 (102–114); hind foot, 385 (381–393); height at shoulders, 879 (864–896). The three-year-old male: Total length, 1283; tail vertebræ, 127; hind foot, 406; height at shoulders, 902. A female lamb in the soft first pelage: Total length, 759; tail vertebræ, 76; hind foot, 279; height at shoulders, 559. The largest of these three females is very old, with worn-out teeth; the others are fully adult.

The August specimens are in much shorter coat and lighter in coloration than those killed in October. The lightest colored specimens are dingy gray-brown finely varied with black hairs. The three-year-old ram is almost black—the darkest specimen I have yet seen — the general color being sooty or brownish black, — nearly black across the shoulders, sides of the shoulders, flanks, and front of the legs. A narrow black stripe runs from the dark area of the back to the tail, dividing the white rump patch into two halves. This feature

is seen in four other specimens, but in the four remaining specimens the black stripe is broken by the rump patch.

The young lamb in first pelage has the coat very fine and soft, of a dull drab gray, with a pale rusty tinge over the shoulders; legs darker; tail stripe continued on to the back.

5. **Oreamnos montanus** (*Ord*). Mountain Goat.

Four specimens, Shesley Mountains, August 24–28. All are males, three of them being old adults and the other about half grown. They are in poor coat, and the color is soiled white, quite different from the clear white of winter pelage. Following are the measurements of the three adult males: Total length, 1625 (1549–1676); tail vertebræ, 191 (178–203); hind foot, 356 (343–368); height at shoulders, 971 (929–992). The smallest specimen of the three (represented by the minimum measurements in the parentheses) is perhaps not fully adult.

Sciuropterus. Flying Squirrels.

Mr. Anderson says: "Flying Squirrels were reported as occurring at the Indian village of Tahltan, twelve miles up the river from Telegraph, but we were unable to secure specimens."

6. **Sciurus (Tamiasciurus) hudsonicus vancouverensis** *Allen*. Vancouver Chickaree.

Sciurus hudsonicus vancouverensis Allen, Bull. Am. Mus. Nat. Hist., III, 1890–91, 165. Nov. 14, 1890. Duncans, Vancouver Island, B. C.

A single specimen, in summer pelage, was collected at Wrangel, Alaska, June 29, and 14 others, nearly in full winter pelage, were taken on Kupreanof Island, near Wrangel, November 5–15.

In the November series the ventral surface in many of the specimens is dark gray, the hairs being plumbeous at the base, then whitish banded near the tip with black, this being the coloration of the winter dress; but many of the specimens still

show a more or less strong fulvous wash on the lower parts, especially over the pectoral and axillary regions, due to portions of the summer coat still remaining, the moult into winter dress not having been completed.

The 14 November specimens from Kupreanof Island measure as follows: 8 males, total length, 312 (291–325); tail vertebræ, 122 (104–134); hind foot, 51 (49–52); ear, 24 (23–26): 6 females, total length, 309.5 (296–321); tail vertebræ, 122 (115–127); hind foot, 50 (49–51); ear, 23 (22–24).

These specimens appear to be distinctly referable to *vancouverensis*, hardly differing in size or color from Vancouver Island examples.

7. **Sciurus (Tamiasciurus) hudsonicus baileyi** *Allen.* Bailey Chickaree.

Sciurus hudsonicus baileyi Allen, Bull. Am. Mus. Nat. Hist., X, 1898, 261. July 22, 1898. Bighorn Mountains, Wyoming; altitude, 8400 feet.

Represented by 47 specimens taken at Telegraph Creek, July 15 to August 15; 2 taken at the head of Shesley River, September 1 and 6; 6 taken on Level Mountain, September 13–19; and 2 on Raspberry Creek, Oct. 5 and 8; making a total of 57 specimens. Greatly to my surprise, they appear to be referable to *S. h. baileyi*, from Alberta specimens of which they do not very appreciably differ. They are hence quite different from *S. h. petulans* Osgood, of which I have several topotypes for comparison, being much paler and grayer in post-breeding pelage, with the tail fringed with yellowish white instead of deep yellow as in *petulans*.

In this large series of specimens, practically all in summer pelage, there are several that depart greatly in coloration from the average or normal phase, an adult male (No. 19874) from Telegraph Creek, August 5, being as red, and of nearly the same shade of red, as average August specimens of *S. h. loquax* taken in New York or New Jersey; while a young male (No. 19868), taken July 30, at the same locality, is also easily matched by specimens of corresponding age from New York.

These are pale yellowish red instead of olivaceous gray, varied slightly with brownish red, which is the average color of the summer pelage in the Telegraph Creek series.

Fully adult specimens (young of the year being excluded) measure as follows: 16 males, total length, 319 (311–325); tail vertebræ, 128 (120–138); hind foot, 50 (48–51); ear, 25 (23.5–26.5): 8 females, total length, 319 (306–324); tail vertebræ, 124.6 (110–135); hind foot, 49.2 (49–50); ear, 24.6 (23–26).

Mr. Anderson says this squirrel was "abundant among the pines, where it could frequently be seen feeding upon the pine nuts or carrying cones to its burrow beneath some tree."

8. **Eutamias caniceps** *Osgood.* GRAY-HEADED CHIPMUNK.

Eutamias caniceps OSGOOD, N. Am. Fauna, No. 19, Oct. 6, 1900, 28. Lake Lebarge, Northwest Territory, Canada.

This chipmunk is represented by 41 specimens, all taken at Telegraph Creek, July 13–September 15, except 2 from Level Mountain, September 10, and 1 from Raspberry Creek, October 5. Of these 41 specimens 24 are males and 17 females, of which latter only two give evidence of having recently nursed young. Of the whole series not more than six or eight can be considered as adult, by far the larger part not having fully acquired their permanent premolars. None of the males exceed a total length of 206 mm., the greater part falling between 195 and 200, with the tail vertebræ ranging from 86 to 92 mm., the hind foot 32, and the ear 15 mm. The two breeding females measure respectively: Total length, 205 and 215; tail vertebræ, 90 and 97; hind foot, 32 and 34; ear, 15.5 and 17. Several other females, though evidently not fully adult, range in total length from 211 to 213 mm.

This chipmunk, recently described by Mr. Osgood from Lake Lebarge, N. W. T. (N. Am. Fauna, No. 19, Oct., 1900, p. 28), is quite different in coloration from *Eutamias borealis*, being much grayer, with the central area of the tail below much paler. A comparison of several topotypes of *caniceps* with Telegraph Creek specimens shows that the latter are

indistinguishable from *caniceps*. Osgood found it ranging northward from Lake Lindeman to Fort Selkirk; to the southward and eastward it is abundant in the Telegraph Creek region, where Mr. Stone first obtained several immature specimens in the summer of 1897.

Mr. Anderson says: "The little chipmunk, of which a considerable number was secured near Telegraph Creek, was most always to be found about the talus piles and other rocky places, where it feeds upon the seeds of the sabis berry and a small red berry which grows on a little plant close to the ground in dry places." At the head of the Shesley River no specimens were taken, but several were observed in the deep cañon. The two specimens taken on Level Mountain "were the only ones seen there."

9. **Citellus erythrogluteius** (*Richardson*). Red-thighed Ground Squirrel.

Arctomys parryi, var. B. *erythrogluteia* Richardson, Faun. Bor.-Amer., I, 1839, 161. Head of Elk River, Rocky Mountains, Lat. 57° N.

Mr. Anderson states that no spermophiles are found in the immediate vicinity of Telegraph village, but a series of 43 was taken on two trips made to Summit, at the head of Telegraph Creek (twelve miles north of Telegraph) July 31 (21 specimens) and August 9 (22 specimens). Another series of 16 specimens was taken on the headwaters of Shesley River, August 23–September 2, where "their burrows could be seen everywhere, but most commonly on hillsides and in little valleys where the earth was soft and not too moist." Both series consist mainly of young-of-the-year, and together show the changes of pelage with season in both the adult and young.

Breeding females in worn pelage, taken July 31, have the general color above gray, washed slightly with brownish over the median area of the back, and mottled with small squarish whitish spots; the whole top of the head, as far back as the posterior border of the ears, dull chestnut brown, brighter and more chestnut anteriorly; cheeks, from below the eyes posteriorly to a little behind the ears, pale yellowish brown;

fore limbs, sides of the shoulders, sides of body and ventral surface grayish white with a faint yellowish tinge, with a tendency to yellowish rust-color on the chest and mid-line of the ventral surface, in part due apparently to the coming in of the new fall coat; tail above gray, broadly fringed with yellowish white, and with a broad subapical bar of black; below, the central area is dull chestnut brown, fringed and tipped as above; upper surface of fore and hind feet pale yellowish gray.

Young specimens, one-fourth to one-half grown, taken at the same place and date, are strikingly like the above-described females, except that the pelage is finer and more woolly; the dorsal area is a little darker or more dusky, with no rufous tinge; the sides of the neck, shoulders, and fore limbs are washed with pale buff; the ventral surface is almost wholly dusky gray, the hairs being for the most part dusky plumbeous, lightly tipped with soiled whitish; tail and feet as in the adults; top of head and nose similar in respect to the extent of the brown area, but the colors are paler.

In the series taken at the same locality August 9 (ten days later) the pelage is much fuller and the colors are much brighter, and the average size of the young-of-the-year has greatly increased. Some of the old males appear to have nearly acquired the full post-breeding dress, at least as regards coloration, though the pelage would still doubtless have appreciably increased in length and fulness. The ground color of the whole dorsal area is now dark iron-gray, or dusky gray, prominently blotched with small squarish spots of white, the hairs individually being dusky at base, centrally ringed with ashy, subapically with black, and tipped with whitish, with which are interspersed many longer wholly black hairs. The top of the nose, as far back as the middle of the eyes, is a bright rusty chestnut; the sides of the neck, shoulders, forearms and thighs and the whole ventral surface extending well up on the sides, are deep rusty ochraceous; the upper surface of the fore and hind feet is deep ochraceous, and the central area of the lower surface of the tail is a much deeper, richer chestnut brown than in the breeding specimens. The larger

of the young-of-the-year specimens are from two-thirds to practically full grown, and differ scarcely at all from the post-breeding pelage of the adults, except that perhaps the sides and the ventral surface are a little paler.

The contrast between these two series, taken only ten days apart, at the same locality, is surprisingly marked, especially when the most advanced adults and largest young-of-the-year of the last set are contrasted with the breeding females and half-grown young of the first set.

The series taken at the head of the Shesley River, two to three weeks later, are quite similar to the more advanced of the August 9 series from Summit, at the head of Telegraph Creek. All of the Shesley River specimens, however, have acquired the winter pelage, while many of the August 9 specimens are still in change, and some are still almost wholly in the worn, faded, breeding pelage.

Most of the 59 specimens in the present collection are young-of-the-year; 11 of the females, however, give evidence of having suckled young; and 7 of the males are obviously adult. The 18 unquestionably adults measure as follows: 7 males, total length, 334 (318–349); tail vertebræ, 86 (75–92); hind foot, 52 (47–56); ear, 11.4 (11–12): 11 females, total length, 324 (308–339); tail vertebræ, 86 (78–100); hind foot, 50.4 (48–54); ear, 11.5 (9–13).

In size and proportions this species closely resembles *Citellus columbianus*, which it also more nearly resembles in general coloration than it does most members of the *parryi* group. It is, however, less strongly colored throughout, and has the central area of the lower surface of the tail rufous instead of gray; besides, it is much smaller and differs strikingly in cranial characters.

Mr. Osgood's *S. empetra plesius* is very closely related to, if not identical with, what is here recognized as *erythrogluteius* Richardson (*Arctomys parryi* var. B. *erythrogluteia* Richardson), the type locality of which is "the Rocky Mountains, near the sources of the Elk River, in latitude 57°." This is very near the localities at which my present large series of specimens was collected; and there is reason to suppose that

its range may extend northwestward to Lake Bennett, the type locality of *plesius* Osgood. Several topotypes of *plesius* (Lake Bennett, June 18–22) are intermediate in coloration between faded July specimens (July 31) and dark September specimens in fresh pelage from Shesley River, as would be expected from the dates of collecting.

Citellus columbianus seems to be specifically distinct from the more northern and very much larger spermophiles constituting the *C. parryi* group, differing greatly in general coloration, especially in the central area of the underside of the tail being gray instead of uniform reddish brown; also in relatively longer tail, much smaller size (fully one-third less), and in the narrower and slenderer skull, etc.[1]

10. **Citellus stonei,** sp. nov. WRANGEL GROUND SQUIRREL.

Type, No. 20775, adult (♂ ?), Wrangel, Alaska, June, 1902; collected by Andrew J. Stone, for whom the species is named.

The type and only specimen of this species is a flat skin (without flesh measurements) with an excellent adult skull, and is apparently a male, and in excellent pelage.

Above gray, suffused with rufous, especially on the median dorsal area, the rufous increasing in intensity on the lower back and rump, where it almost becomes the prevailing tint; the hairs individually are blackish basally, then broadly banded with bright buff (almost golden apically), then narrow-banded with dark brown tinged with rusty, and broadly tipped with whitish, more or less suffused with rufous over the median and posterior portions of the dorsal area; with these hairs, constituting the bulk of the pelage, are much longer

[1] A comparison of a series of five specimens of C. *columbianus* from Moscow, Idaho (hence topotypes), with six specimens from Banff, Alberta, shows that the latter differ from the former in certain features of the skull, although the two series are closely similar in size, proportions, and coloration, except that the Banff specimens are a little paler. The skull in the Banff specimens, while but slightly larger in linear dimensions, is much heavier and more massive, with the zygomata especially thickened, the malar being nearly twice as massive as in true *columbianus*, while the antorbital foramen is sharply triangular instead of circular, with the peg-like process forming its lower border much more heavily developed and angular, and the postpalatal border is more produced posteriorly. For this form I propose the name

Citellus columbianus albertæ, subsp. nov.

Type, No. 15539, Am. Mus., ♂ ad., Canadian National Park, Alberta, Canada, August 16, 1899; coll. G. F. Dippie.

Collector's measurements of type: Total length, 321; tail vertebræ, 108; hind foot, 57 mm. Three other specimens in the series slightly exceed these dimensions. Skull, total length, 52; zygomatic breadth, 33.

hairs which are apically wholly black. Front half of the top of the head rusty cinnamon, the posterior half rusty, strongly varied with blackish; sides of face and neck clear gray; fore limbs lighter gray with a faint buffy wash; sides of shoulders suffused (mostly beneath the surface) with pale rufous; thighs pale rufous, with the longer hairs banded subapically with black and with long white tips, mixed with a few wholly black-tipped hairs; upper surface of hind feet deep rusty yellow or orange, the edges and lower surface clothed with gray or yellowish gray hairs; front and sides of nose, under side of head, throat, breast, and inside of fore legs whitish, the base of the pelage blackish plumbeous; rest of ventral surface washed rather strongly with pale rufous; tail above at extreme base tinged with rusty, the rest gray, with a faint tinge of rufous apically at the base of the hairs, the sides with a narrow band of black and a broad fringe of pale yellowish white; a broad (25–30 mm.) subapical band of black; tail below with the central area pale brownish rusty, increasing in intensity apically, with a broad subapical band of black and a yellowish white fringe.

Measurements (from flat skin, apparently much shrunken). Total length, 350; tail vertebræ, 100; hind foot, 59.

Skull. — Large, equal in dimensions to large skulls of *Citellus barrowensis* and *C. parryi*, but general form less broad anteriorly and rostral portion more elongated, giving quite a different contour as seen from above; interorbital area and nasals narrower, breadth across base of premaxillæ one-eighth to one-seventh less; antorbital foramen oval, very broad and depressed. Total length, 59; greatest zygomatic breadth, 37; nasals, 22, terminating about evenly with the premaxillæ; width of nasals at base, 5, as against 6 to 7 in *barrowensis* and *parryi*.

Citellus stonei is easily distinguished from *C. erythrogluteius* (and *C. plesius* if different) through its immensely larger size and very different coloration; and also from *C. osgoodi*, *C. barrowensis* and *C. parryi* [1] in coloration, as well as in cranial characters, as above detailed. In coloration it bears very little resemblance to either of the three species last mentioned, though perhaps most approaching *C. osgoodi* in general features.

[1] In the series of C. *parryi* collected by Mr. George Comer for this Museum in the vicinity of Repulse Bay are several specimens that fulfil all the requirements of Richardson's *Arctomys parryi*, var. γ, *phœognatha*, reputed to have been based on a specimen said to have been "also brought from Hudson's Bay, but the particular district not mentioned" (Fauna Bor.-Amer., I, p. 161) and described as "characterized chiefly [in comparison with *parryi*] by a well-defined deep, chestnut-coloured mark under the eye." Two out of the Comer series of nine specimens are thus marked and a third shows a trace of the same mark, which is apparently a feature of season or of very high coloration.

11. **Marmotta caligata** (*Eschscholtz*). HOARY MARMOT.

Arctomys caligatus ESCHSCHOLTZ, Zoöl. Atlas, II, 1829, p. 1, pl. vi. Near Bristol Bay, Alaska.

A series of 13 specimens was taken on the Cheonnee Mountains, July 21–24, of which four were old nursing females, one an adult non-breeding female, three half-grown and five quarter-grown young. There are also two adults from Shesley River, taken August 23 and 27, and an old male from Level Mountain, taken September 16, making a total of 16 specimens.

The quarter-grown young from the Cheonnee Mountains, in the first, soft, woolly pelage, differ little in general pattern of coloration from the adults from the same locality, but the lower back is less varied with black. The pelage in all of the adults is thick and heavy but more or less worn, and there is considerable individual variation in the amount of black in the dorsal pelage. Generally from the nape posteriorly to the middle of the back, including the shoulders and sides, the color is whitish gray, and the rest of the dorsal surface blackish varied with rusty brown; but in one of the Shesley River specimens the prevailing color above over the anterior half of the body is black varied with gray.

A single adult male from Level Mountain measures as follows: Total length, 792; tail vertebræ, 210; hind foot, 100; ear, 32. Five breeding females (four from the Cheonnee Mountains and one from Shesley River), measure: Total length, 668 (659–672); tail vertebræ, 189 (180–200); hind foot, 95 (93–96); ear, 34 (33–37).

Mr. Anderson states that these animals were first met with in the Cheonnee Mountains, they not being found in the immediate neighborhood of Telegraph Creek. "In the Cheonnees, as elsewhere," he says, "these animals are found in dry, rocky places. They are very wary and shy." On Level Mountain, September 8–21, their "burrows were frequently seen in the numerous rocky localities, but the animals were undoubtedly beginning to hibernate. The whistle of one was heard on September 15, and Dennis [the Indian helper] shot

a specimen September 16." In the neighborhood of Shesley River camp none was found, but two specimens were brought in from a distance.

12. **Mus musculus** *Linnæus.* House Mouse.

Three specimens, Telegraph Creek, August 2, 6, and 7. They were trapped about the buildings in the village of Telegraph.

13. **Peromyscus sitkensis** *Merriam.* Sitka White-footed Mouse.

Peromyscus sitkensis Merriam, Proc. Biol. Soc. Wash., XI, July 15, 1897, 223. Sitka, Alaska.

Eight specimens (2 adults, 1 young adult, 5 half to two-thirds grown young), from Wrangel, June 27–30, and two young adults from Kupreanof Island, November 8. In six of the oldest specimens the tail averages just one-half the total length, varying from a little less to a little more than half.

According to Mr. Anderson's notes, these specimens "were trapped under rotten logs in the higher and dryer places."

14. **Peromyscus arcticus** (*Mearns*). Arctic White-footed Mouse.

Hesperomys leucopus arcticus Mearns, Bull. Am. Mus. Nat. Hist., II, No. 4, 1890, 285. Feb. 20, 1890. Fort Simpson, Mackenzie River, Canada.

All of the white-footed mice from the interior are referred to *P. arcticus*, except a single specimen from the Cheonnee Mountains which appears referable to *P. oreas* Bangs. The series numbers altogether 292 specimens, collected as follows: Telegraph Creek, 272 specimens, July 11–August 17; Cheonnee Mountains, 4 specimens, July 22 and 23; Shesley River, 3, August 23 and 24; Level Mountain, 3, September 12–15; Raspberry Creek, 10, October 8–12. About four-fifths of the series consists of young-of-the-year and 'young adults.' Of the large number of females only about 50 give evidence of

having suckled young, or show by their worn teeth that they were fully adult. As of interest in showing the wide range of variation in size and proportions in breeding females, the collector's measurements of 40 specimens, all from Telegraph Creek, and including all of the breeding females in the series of 265 specimens, are tabulated below in the order of size, from which it will be seen that the total length ranges in old adults with well-worn teeth from about 180–190 mm., with the tail length ranging from about 82 to nearly 90; while the young females, with generally wholly unworn teeth and many of them still in the pelage of immaturity, range from about 165 to 175, with a tail length of from about 72 to 80. It will also be noted that the ratio of tail length to total length is considerably higher in the larger and older specimens than in the younger and smaller ones, ranging from about 44 to 48 in the former and 42.5 to 46 in the latter. It thus appears that the length of the tail, as perhaps would be expected, increases more than the length of the head and body between the period of breeding age and complete maturity or old age.

An examination of the skulls of these specimens shows that while this wide range of variation in size may be referred in large part to age, the element of individual variation also plays an important part, since one of the largest specimens in the series has the teeth unworn and the bones of the skull not firmly united, while on the other hand, several of the smallest specimens have the teeth greatly worn and the skull sutures firmly closed.

There is a much smaller proportion of adult males in the collection than of adult females, but so far as the material goes, there is no appreciable sexual difference in size.

The type locality of *Peromyscus arcticus* was Fort Simpson, on the Mackenzie River, about half way between Fort Liard and Fort Norman. Fortunately the American Museum collection contains a small series from each of these points, and also from Hell Gate and Telegraph Creek, taken by Mr. Stone in 1897 and 1898, numbering altogether about 30 specimens. These, with the collection now under special notice, represent the species by specimens taken in April, May, July,

August, September, and October. The April and May adults, and the September and October specimens are much darker, or more blackish, and less faded than the July and August specimens, which are in moult and in thin pelage in comparison with the thick, soft, and longer coat of the April-May and September-October examples.

The young are born, judging from the present material, mainly during July and the first half of August; April and May females not yet having begun to nurse young, while in September and October the nipples have become so shrunken and the mammæ so heavily enclosed in soft fur that it is difficult to distinguish males from females by an examination of the skins. During the nursing period, and until the completion of the moult, a bare space surrounds the nipples, indicating, usually at a glance, the females that have recently nourished young.

Mr. Anderson states: "Near Telegraph, white-footed mice were trapped in every kind of place to be found, wet or dry, talus or level terrace." At the camp at timber-line on the Shesley River they "were not common," and only three were obtained on Level Mountain; but they were very abundant at the camp on Raspberry Creek.

EXTERNAL MEASUREMENTS OF 40 BREEDING FEMALES OF *Peromyscus arcticus.*

Mus. No.	Total length.	Tail vertebræ.	Hind foot.	Ear.	Ratio of tail vert. to total length.
20150	189	86	20.5	18	45.5
20352	187	90	20	18	48
20168	186	83	21	18.5	45
20356	185	87	20	18	47
20204	185	83	21	19	45
20334	184	87	20.5	20	47
20109	184	81	21	18.5	44
20116	183	81	22	19	44.3
20261	182	85	20	18	46.7
20294	181	85	20.5	20	47
20274	181	84	20	19.5	46.3

EXTERNAL MEASUREMENTS—*Continued.*

Mus. No.	Total length.	Tail vertebræ.	Hind foot.	Ear.	Ratio of tail vert. to total length.
20296	179	82	20.5	19.5	45.8
20242	179	82	21	19	45.8
20215	179	81	20	18	45
20221	178	82	19.5	18	46
20344	178	82	21.5	18	46
20308	178	80	20.5	18.5	45
20280	177	80	21	19	45
20118	177	78	21	18	44
20108	176	86	21	18	48.8
20183	176	78	21	20	44.3
20120	176	75	22	20	42.6
20184	175	78	20	18	44.6
20249	175	78	21	18	44.6
20117	175	76	19	18.5	43.4
20100	174	80	20	19	46
20281	174	78	20	18.5	45
20167	174	77	20	18	44.3
20246	172	74	20	19	43
20158	172	74	20	19	43
20324	171	78	19.5	18	45.6
20186	171	75	20	18	43.9
20219	171	72	21	18	42
20205	170	78	20	19	46
20345	170	75	19	19	44
20263	170	74	20	17 (?)	43.5
20157	169	72	20	19	42.6
20133	167	77	21	19	46
20122	167	74	20	18	44.3
20269	163	71	20	18	43.5
Average....	176	78.9	20.4	18.6	44.8

7 specimens have a total length of 184 or more.
16 " " " " " 174 or less.
17 " " " " between 174 and 184.
8 " " a tail length of 84 or more.
9 " " " " " 74 " less.
23 " " " " " between 74 and 84.
Ratio of tail vertebræ to total length, 42 to 48.
22 specimens have a tail ratio of 45 or above.
18 " " " " less than 45.

15. **Peromyscus oreas** *Bangs.* BANGS WHITE-FOOTED MOUSE.

Peromyscus oreas BANGS, Proc. Biol. Soc. Wash., XII, 84, March 24, 1898. Mount Baker Range, 49th parallel, British Columbia; altitude, 6500 feet.

A single specimen, Cheonnee Mountains, July 22, a young male with the following measurements: Total length, 189; tail vertebræ, 100; hind foot, 23; ear, 19. In color and character of pelage it closely resembles young adults of *P. sitkensis*, but the skull is very different from the skull of that species. Mr. Osgood (N. Am. Fauna, No. 19, Oct. 1900, p. 32) has recorded *P. oreas* from Skagway, Glacier, Summit, Bennett, Caribou Crossing and other points near the head of the Yukon, showing that its range extends to the northward much beyond the Telegraph Creek region, where, however, it seems to be rare, as only one of the three hundred specimens of *Peromyscus* taken here proves referable to this species.

16. **Neotoma cinerea saxamans** (*Osgood*). NORTHERN BUSHY-TAILED RAT.

Neotoma saxamans OSGOOD, N. Am. Fauna, No. 19, Oct. 6, 1900, 33. Bennett City, head of Lake Bennett, B. C.

Represented by 46 specimens, taken as follows: Telegraph Creek, 41 specimens, July 17 and 18, and July 27 to August 15; Level Mountain, 2 specimens, September 10 and 21; Raspberry Creek, 2 specimens, October 9 and 11; Sheep Creek, 1 specimen, October 14. Of these 8 are breeding females, and 3 are fully adult males; the others are apparently all young-of-the-year, and vary from about quarter-grown to full-grown. The young in first pelage are, above, blackish gray; below, with a large pure white pectoral area, and the rest of the underparts with the fur plumbeous tipped more or less with whitish, the white particularly conspicuous along the median line, and expanding to form a small clear white anal patch. In many specimens of this age the whole ventral surface is superficially pure white, with the underfur more or

less plumbeous. Later the amount of white below increases till in half-grown specimens the whole ventral surface is white, with the pelage on the lateral third of the ventral area on either side, more or less plumbeous basally. The color of the upper parts is still dusky gray. When about full-grown the yellowish brown of the adult pelage begins gradually to appear.

The adults in full pelage are yellowish olivaceous brown above, strongly washed with blackish, through the abundance of long black-tipped hairs intermixed with the general pelage; below pure white to the base of the hairs, with a tendency to a buffy wash over the middle of the abdominal area. In the worn, faded pelage of the breeding season the upper surface is suffused with pale cinnamon brown.

Eleven adults measure as follows: 3 males, total length, 409 (399–425); tail vertebræ, 171 (167–180); hind foot, 47.3 (46–49); ear, 32: 8 breeding females, total length, 370.5 (358–380); tail vertebræ, 156 (147–165); hind foot, 44.3 (42–46); ear, 30 (28–31).

Six adult skulls, three males and three females, measure: Total length, 51.5 (49–53); zygomatic breadth, 26. 4 (25.4–27.2); interorbital breadth, 5 (4.8–5.2); nasals, 21 (20–22).

Neotoma cinerea saxamans differs from *N. c. drummondi* in being paler and of a more yellowish gray brown above, with also the upper parts more strongly varied with blackish. A comparison of the present material with a small series of specimens from the vicinity of Banff, Alberta, shows that the alleged cranial differences mentioned in the description of *Neotoma saxamans* are of very slight importance, adult and strictly comparable skulls from Banff and Telegraph Creek being indistinguishable as regards the form of the nasals, the maxillary branch of the zygoma, and the more or less openness of the spheno-palatine vacuities. There is apparently a slight average color difference between true *drummondi* and the more northern bushy-tailed rats, and also in the cranial characters indicated by Osgood, but the Telegraph Creek series presents intermediates, and shows that all of these features are subject to considerable individual variation.

The color of the incisors, given also as a character, is very variable, ranging from pale yellow to deep yellow. The single specimen of *saxamans* of which external measurements are given, from "a dry skin," considerably exceeds in size any of the specimens from the Telegraph Creek region, but the cranial measurements show that this difference is apparent rather than real.

At Telegraph Creek the bushy-tailed rats were "fairly abundant"; they were "trapped in the talus just beneath the cliffs above Telegraph, and in several other rocky places." At the camp at the head of the Shesley River (at timber-line) none was secured and only one was seen. Only two were taken on Level Mountain. Two were trapped at the camp on Raspberry Creek, "beside a large rock in a dry flat, away from timber."

17. **Evotomys wrangeli** *Bailey.* WRANGEL RED-BACKED MOUSE.

Evotomys wrangeli BAILEY, Proc. Biol. Soc. Wash., XI, May 13, 1897, 120. Wrangel Island, Alaska.

Wrangel Island, 18 specimens (topotypes), June 25 to July 7, of which 6 are adults, 7 are nearly full-grown young, and 5 about half-grown. Four adult females measure as follows: Total length, 145 (141–147); tail vertebræ, 33 (31–34); hind foot, 19.6 (19–20.5); ear, 14.2 (13–15). The two adult males are smaller, measuring respectively: Total length, 136, 138; tail vertebræ, 30, 33; hind foot, 19.5, 20; ear, 15, 14.5. In coloration they exactly resemble the females, showing that they are fully adult. The nearly full-grown young (total length 129–138) are much duller and darker, with much less red on the back.

18. **Evotomys dawsoni** *Merriam.* DAWSON RED-BACKED MOUSE.

Evotomys dawsoni MERRIAM, Am. Nat., XXII, July, 1888, 649. Finlayson River, Northwest Territory, Canada.

Represented by 67 specimens, as follows: Telegraph Creek, 5 specimens, July 13, and August 4, 7, and 17; Cheonnee

Mountains, 11, July 21–25; Level Mountain, 42, September 10–21; Raspberry Creek, 9, October 6–13.

The type of *Evotomys dawsoni* was from the Finlayson River, a northern fork of Liard River. The present series added to the 16 specimens taken by Mr. Stone at Fort Norman, at Fort Liard, at Hell Gate on the Liard River, and at other localities in the same general region, forms a series of 83 specimens collected at various dates from the middle of July to the middle of December. There is also in the collection the series of 35 specimens obtained by the Stone Expedition of 1901 on the Kenai Peninsula, making about 120 specimens referable to this species. The adults are very uniform in coloration except three taken on the Liard River December 7–11, 1897,[1] and one at Dawson; these differ from all the others in their much lighter, yellowish brown color, and represent apparently the midwinter coat, which is usually lighter than that of late summer and early fall. There can be little doubt that these specimens are referable to the true *E. dawsoni* from Finlayson River and Fort Liard. Yet they fall far below the average size as given by Bailey (Proc. Biol. Soc. Washington, Vol. XI, 1897, p. 121), based on Yakutat specimens, of which he gives the average of eight specimens as: "Total length, 144; tail vertebræ, 33; hind foot, 20."

The series from the upper Liard River region contains many specimens with well-worn teeth and very mature-looking skulls, yet only 5 attain a length of 140 mm., the average of 20 of the largest specimens of the series falling slightly below 130, with an average length of tail of about 33, but with the hind foot 19 instead of 20. Thus 13 specimens (9 males and 4 females) from Level Mountain measure as follows: Total length, 129 (123–141); tail vertebræ, 32.7 (29–38); hind foot, 18.6 (18–19.5); ear, 15.6 (14–16.5). The largest 13 specimens from the Kenai Peninsula (6 males and 7 females) are somewhat larger, having a total length of 137 (133–140); tail vertebræ, 32.6 (31–38); hind foot, 19 (18–

[1] Formerly (this Bulletin, Vol. XII, 199, p. 5) erroneously referred to *E. alascensis*, as shown on reëxamination, in the light of more abundant material. The supposed cranial differences mentioned prove to be due to the immaturity of the single complete skull available for examination.

19.5). These latter measurements are very close to those given by Dr. Merriam for his *E. orca* from Prince William Sound.

It may prove that the larger Alaska coast specimens (Yakutat north to Alaska Peninsula) are better referable to *E. dawsoni orca* than to *E. dawsoni.*

19. **Microtus mordax vellerosus** (*Allen*). Woolly Vole.

Microtus vellerosus Allen, Bull. Am. Mus. Nat. Hist., XII, 1899, 7. March 4, 1899. Upper Liard River, Northwest Territory, Canada.
Microtus cautus Allen, *ibid.*, Hell Gate, Liard River.

Represented by 53 specimens collected as follows: Telegraph Creek, 38 specimens, July 11 to August 8, and October 18–20; Cheonnee Mountains, 1, July 24; Tahltan River, 1, August 18; Shesley River, 1, August 27; Level Mountain, 6, September 11–19; Raspberry Creek, 5, October 4–6; Sheep Creek, 1, October 14. About three-fifths are adult, of which only 7 reach or exceed 190 mm., in total length. Of the series of nearly 40 specimens from Telegraph Creek the 27 adults (6 males and 21 females) measure as follows: *Males:* Total length, 175.3 (158–190); tail vertebræ, 61.3 (52–70); hind foot, 20.8 (19–21); ear, 14 (13–15). *Females:* 176 (160–195); 60.6 (50–70); 21 (19.5–21.5); 14 (13–15). Nine old adults (7 males and 2 females) from the other localities measure slightly larger, as follows: Total length, 182.5 (168–202); tail vertebræ, 65 (60–70); hind foot, 20.7 (19.5–22); ear, 14 (13–15).

The series well illustrates the pelages of adults from July to October, and of the young in various stages of growth. The adults vary considerably in the amount of yellowish brown suffusing the dorsal surface, even among specimens taken at the same season and locality. July specimens have this tint brighter and stronger, often reddish brown, than September and October specimens, which are grayer and more yellowish brown, but some October specimens have a rufescent brown cast, while others are much paler and grayer. The type of *M. vellerosus* is a very gray specimen from the upper Liard

OF
CALIFORNIA

River, taken the last of November. It is the grayest specimen of the whole series; but several October specimens from Telegraph Creek very closely resemble it. My *M. cautus* (see this Bulletin, Vol. XII, 1899, p. 7) is a May specimen, also from Liard River, and though more yellowish brown on the back, is easily matched by the brighter specimens of the October series, and is, as stated by Mr. Bailey [1] (N. Am. Fauna, No. 17, 1900, p. 48, footnote), a phase of *vellerosus*.

The present large series shows that *vellerosus* is rather darker colored and more rufescent than *mordax*, and somewhat smaller, the hind foot averaging 21 mm., instead of 22, and the ear 14 instead of 15. Six specimens of *mordax* (the type and 5 topotypes) measure (*cf.* Merriam, N. Am. Fauna, No. 5, 1891, p. 62) as follows: Total length, 184 (180–200); tail vertebræ, 67.3 (63–77); hind foot, 22 (21–23). Seven adults from Amador County, California, collected and measured by Mr. W. W. Price, range as follows: Total length, 193 (181–202); tail vertebræ, 66.2 (57–67); hind foot, 22.9 (20–25); ear, 15.1 (14–16). *Microtus vellerosus* seems well-entitled to stand as a northern subspecies of *M. mordax*.

20. **Microtus drummondi** (*Aud. & Bach.*). Drummond Vole.

Arvicola drummondi Aud. & Bach., Quad. N. Am., III, 1853, 106, pl. cxxxv. "Valley of the Rocky Mountains."

Microtus drummondi Bailey, N. Am. Fauna, No. 17, June, 1900, 22. "Type locality, Rocky Mountains, vicinity of Jasper House, Alberta."

Represented by 39 specimens, taken as follows: Cheonnee Mountains, 3 specimens, July 22–25; Telegraph Creek, 1, July 27; Shesley River, 4, August 25 to September 1; Tahltan River, 1, August 18; Level Mountain, 30, September 10–21. Only 12 are fully adult, 7 of which are males and 5 are females; all of the adults, except one, are from Level Mountain, and

[1] In his comment on these species he has transposed the names *vellerosus* and *cautus;* his remarks respecting the former relate to the latter, and *vice versa.*

measure as follows: 7 males, total length, 151 (146–162); tail vertebræ, 41.3 (40–46); hind foot, 18.4 (18–19); ear, 12.7 (12–13): 5 females, 155 (153–158); 42 (40–44); 18.6 (18–19.5); 13.2 (13–14).

There is a wide range of individual variation in color, both July and September specimens varying above from a dark gray brown, slightly suffused with yellowish brown, to darker brown strongly suffused with chestnut; the underparts may be pure gray or strongly washed with buffy, especially in fall specimens after the moult.

It is of interest to note that 30 of the 39 specimens of this species were taken on Level Mountain and only one at Telegraph Creek; while in the case of *M. m. vellerosus* 38 out of 52 specimens were taken at Telegraph Creek, and only 6 on Level Mountain, showing that the two forms occupy different areas of abundance.

My *Microtus stonei* (this Bulletin, Vol. XII, 1899, p. 5), based on a specimen from the head of Liard River, is unrepresented in the present collection. The present large series of *M. drummondi*, together with a series of over 20 specimens from northern Alberta, furnish ample means for the comparison of *M. stonei* with *M. drummondi*. Instead of "the type of *M. stonei*" being "indistinguishable from typical *drummondi*" (*cf.* Bailey, N. Am. Fauna, No. 17, 1900, p. 23), it proves to be cranially widely different, although externally closely resembling *drummondi*. In *M. stonei* the rostral portion of the skull, including the interorbital region, is very narrow and greatly elongated, in strong contrast to the short, broad form of this portion of the skull in *M. drummondi*, and the incisive foramina are correspondingly long and narrow. In *stonei* the superior aspect of the interorbital region has also a deep longitudinal groove never present in *drummondi;* and the maxillary branch of the zygoma is much narrower; the angular process of the lower jaw is longer, slenderer, and more pointed. The form of the posterior loop of the last upper molar is also distinctly different. *M. stonei* may therefore be regarded as specifically distinct from *M. drummondi.*

21. **Microtus macrurus** *Merriam.* Olympic Vole.

Microtus macrurus Merriam, Proc. Acad. Nat. Sci. Phila., 1898, 353. Oct., 1898. Lake Cushman, Olympic Mountains, Washington.

A single specimen, a 'young adult' male, from Kupreanof Island, southeastern Alaska, taken November 10. Total length, 165; tail vertebræ, 61; hind foot, 20; ear, 14. Above very dark gray brown, or blackish brown, with an almost imperceptible yellowish suffusion; below dark gray, the longer hairs tipped with whitish.

22. **Fiber spatulatus** *Osgood.* Northwest Muskrat.

Fiber spatulatus Osgood, N. Am. Fauna, No. 19, Oct. 6, 1900, 36. Lake Marsh, Northwest Territory, Canada.

One specimen, an old male, Shesley (Government telegraph station), September 5.

This specimen greatly exceeds the measurements given for *F. spatulatus*, but agrees with the description of this species in all other characters. As shown by the massive, heavily ossified skull, the animal was a very old male. The external measurements are: Total length, 583; tail vertebræ, 290; hind foot, 78; ear, 23. Skull: Total length, 68; basal length, 64.5; zygomatic breadth, 43; length of nasals, 24; least width of nasals posteriorly, 3; greatest width anteriorly, 11.2; alveolar length of molar series, 15; length of crown surface, 13.

A specimen of corresponding age and sex from Hastings, Westchester Co., N. Y., measures as follows: Total length, 591; tail vertebræ, 274; hind foot, 83. Skull: Total length, 65; basal length, 62; zygomatic breadth, 39.6; length of nasals, 22; least posterior width of nasals, 2.6; greatest anterior width of nasals, 8.6; alveolar length of molar series, 16; length of crown surface of molar series, 15. The Shesley skull thus exceeds in linear dimensions and greatly in massiveness any skull in a very large series of eastern Muskrats; and also exceeds the type specimen of *F. spatulatus* by about 20 per cent. in total length, and about 7 per cent. in the principal skull measurements.

Muskrats, like most other mammals, continue to increase in size after maturity is reached, the skull increasing somewhat in linear measurements and especially in massiveness. The type of *F. spatulatus* is given as "yg. ad.," and no other specimens from the type region are referred to. If the character, "size small," is based on this specimen, this comparative statement should be eliminated, as shown by the following table of comparative measurements, giving the principal dimensions of the seven largest Muskrat skulls in the Museum series of considerably over one hundred specimens. They are all very old examples, and range much above the average, doubtless, for the several forms they represent. This is at least true of the New York and New Jersey series.

COMPARATIVE MEASUREMENTS OF SKULLS OF MUSKRATS.

Mus. No.	Species.	Sex.	Total length.	Basal length.	Zyg. breadth.	Nasals.			Molar series.
						Length.	Post. width.	Ant. width.	
98567	Fiber spatulatus.....	♀	—	57	38	21	—	—	14
20768	" "	♂	68	64.5	43	24	3	12	15
16422	" osoyoosensis....	♂	66	63	42	25	2	10	15
16421	" "	♀	65.5	62	41.2	23	2.5	10	16
16204	" zibethicus.....	♂	69	65	42	24	3	10	15
16205	" "	♀	69	64.6	41	24	3	10	16
8541	" "	♂	65	62	39.6	22	2.6	8.6	16
15980	" "	♂	68	64	43	24	3	9	16

No. 98567, U. S. Nat. Mus., type of *Fiber spatulatus* Osgood. Lake Marsh, N. W. T. (measurements from Osgood, *l. c.*).

No. 20768, Am. Mus., Shesley, B. C.

No. 16422 and 16421, Am. Mus., Kettle River, B. C., near type locality of *Fiber osoyoosensis*.

No. 16204 and 16205, Am. Mus., Newport, Nova Scotia.

No. 8541, Am. Mus., Hastings, Westchester Co., N. Y.

No. 15980, Am. Mus., Paterson, N. J.

Mr. Anderson says (MS. notes): "On September 5 a single muskrat was shot on the marshy edge of a small lake about a mile from Shesley; another was shot at, but not secured.

Muskrats are not uncommon in many of the small lakes so numerous along the Teslin trail, and more specimens would certainly have been secured had we carried a shotgun on our trip to Level Mountain. . . . On the morning of October 9 I observed a muskrat in a small pond just back of our camp, on Raspberry Creek. I had no means of securing him."

23. **Phenacomys constablei** *Allen.* CONSTABLE VOLE.

Phenacomys constablei ALLEN, Bull. Am. Mus. Nat. Hist., XII, 1899, 4. March 4, 1899. Telegraph Creek, B. C.

Represented by 11 specimens, of which 8 were taken at Telegraph Creek, July 14 to August 13; and 1 each on the Cheonnee Mountains (July 21), Shesley River (September 1), and Level Mountain (September 11). All are females except two, and five of them appear to have suckled young, but only four had attained fully adult size. The five adults measure as follows: Total length, 143.5 (139–148); tail vertebræ, 33 (31–41); hind foot, 17.7 (17–19); ear, 13.6 (13–14).

Phenacomys constablei was based on two specimens collected by Mr. A. J. Stone on Telegraph Creek, August 24, 1897, so that eight of the present series are topotypes. Both of the original specimens were females, one of which was quite young, while the other (the type) had evidently nursed young and was described as adult. The present series, however, shows it was much below the average size of full-grown adults, the total length being only 124 mm., and the tail 31 mm., as against 144 and 33 in fully adult females of the present series. In other respects the original description requires no emendation.

This species must be very rare or of local distribution, as out of over 350 specimens of mice of various species taken at Telegraph Creek only 8 were *Phenacomys*, and only two *Phenacomys* were taken elsewhere, although very large numbers of mice were collected on Level Mountain and at other points.

This species has a close external resemblance to faded summer specimens of *Microtus drummondi*, not only in coloration but in size and proportions, so close, indeed, that it is quite difficult to distinguish the two species by skins alone. The

form of the hind foot — broad and short in *Phenacomys* and long and slender in *M. drummondi* — and certain differences in the size and position of the plantar tubercles, however, will usually suffice for their discrimination. In the reddish brown fall dress, with the underparts more or less tinged with buff (September, October, and November specimens), of *M. drummondi* there is a well-marked contrast in color with July and August specimens of *Phenacomys constablei;* but the adult fall pelage of the latter is not as yet known.

24. **Synaptomys (Mictomys) andersoni,** sp. nov. ANDERSON LEMMING VOLE.

Type, No. 20467, ♀ ad., Level Mountain, northern British Columbia, September 11, 1902; M. P. Anderson.

Above dark brown, faintly suffused with clay color and strongly varied with blackish, the head, including the sides of the nose and cheeks, concolorous with the back; under surface ashy gray, rather sharply defined against the yellowish brown flanks; tail bicolor, the dorsal third blackish, the sides and lower surface dull grayish; upper surface of fore and hind feet blackish brown, the hind feet rather darker than the fore feet; ears small, wholly concealed in the fur.

Total length, 120; tail vertebræ, 25; hind foot, 18; ear, 11.5. Skull: Naso-occipital length, 24.6; basal length, 23; zygomatic breadth, 14.5; mastoid breadth, 11.5; interorbital constriction, 3; length of braincase, 14; length of rostrum (front edge of nasals to braincase), 11; length of nasals, 6; length of incisive foramina, 4.2; length of upper toothrow, 6.6. General form of the skull much as in *S. wrangeli*, but bullæ much more inflated, especially anteriorly, and the posterior loop on the last upper molar much larger, about two-thirds as large as the middle loop; reëntrant angle on outer side of last molar deeper, nearly as deep as in *S. truei.*

Synaptomys andersoni is based on a single adult specimen collected on Level Mountain, northern British Columbia, September 11, and is in heavy fall pelage. Its nearest known geographical representative is *S. wrangeli*, from Wrangel, Alaska, from which it is apparently quite distinct, it in some features more resembling *S. dalli* from Nulato, Alaska. The species is named for Mr. M. P. Anderson, whose very careful field work has so greatly contributed to the success of the Stone Expeditions of 1902 and 1903.

[In a small collection of mammals made by Mr. Frank M. Chapman at Glacier, B. C., in July, 1901, is a single specimen of *Synaptomys* that seems specifically distinct from any previously recognized, and which I take the present opportunity to describe.

Synaptomys (Mictomys) chapmani, sp. nov. CHAPMAN LEMMING VOLE.

Type, No. 16908, ♂ ad., Glacier, Selkirk Range, British Columbia, July 20, 1901; Frank M. Chapman, for whom the species is named.

Above grayish brown, with a slight suffusion of buff, strongest on the front of the head, the whole region in front of the eyes being conspicuously washed with buff; ventral surface dark gray, the plumbeous underfur being slightly tipped with whitish, not sharply defined against the sides; ears large, colored like surrounding pelage; feet dusky grayish brown; tail very short, darker above than below, well pencilled. Side glands in front of hips covered with conspicuously lighter fur, almost whitish.

Total length, 134; tail vertebræ, 21; hind foot, 20; ear (from notch, in dry skin), 11; prominent above the fur. Skull: Naso-occipital length, 26; basal length, 24.5; zygomatic breadth, 15.2; mastoid breadth, 11.5; interorbital constriction, 3; length of braincase, 13.5; length of rostrum (front edge of nasals to braincase), 12.2; length of nasals, 6.6; length of palatal foramina, 5; length of upper toothrow, 7. Compared with *S. andersoni* it is much larger, and the general form of the skull is narrower, with a relatively narrower braincase and more elongated rostrum; the incisive foramina are much longer and narrower, and the audital bullæ much smaller and less inflated; last loop of last upper molar large, as in *S. andersoni*, and the reëntrant angle on the outer border of last lower molar is also strongly marked.

Unfortunately this species is represented only by the type, an old male, taken at Glacier, B. C., by Mr. Chapman in July, 1901. Externally the species seems to be well characterized by its very short tail and large ears, the dark grayish brown color of the upper parts and buffy nose. The narrow skull, elongated rostrum, and small bullæ seem to distinguish it from its more northern allies. The presence of this species in the Selkirks extends considerably to the southward, especially in the West, the previously known range of the subgenus *Mictomys*.]

25. **Lemmus helvolus** (*Richardson*). GOLDEN LEMMING.

This beautiful lemming is represented by 43 specimens, collected as follows: Telegraph Creek, 28 specimens, July 31, August 9, and October 17; Level Mountain, 11, September 10–25; Shesley River, 1, August 27; Raspberry Creek, 1, October 11; and 2 without locality. Only about 12 are adult, the others ranging from nursing young to two-thirds grown.

In the adults the anterior half of the upper surface is gray suffused with fulvous, the sides and top of the head and neck being gray or grayish, gradually passing into deep yellowish brown over the shoulders, and thence posteriorly to the tail the color ranges, in different specimens, from ochraceous, or even golden, to ochraceous rufous, and in some to reddish chestnut. (Late September and October specimens have the upper parts lighter or more golden than the August examples.) The flanks are deep ochraceous, varying to orange ochraceous; chin and throat soiled grayish white; rest of the ventral surface ranging in different specimens from deep buff to ochraceous buff. In the half to two-thirds-grown young the head is more heavily suffused with fulvous than in adults, and there is hence less contrast between the anterior and the posterior parts of the dorsal area. Young in the soft, woolly, first pelage are dull brown strongly washed with dark rufous, with nearly the same contrast in color antero-posteriorly as in the adults. In all pelages there is a slight admixture of stiff black or blackish-tipped hairs overtopping the general pelage, varying greatly in abundance in different individuals that are comparable as to season and age.

This species, like most microtines, begins to breed at an early age, and greatly increases in size after birth of the first young. The largest specimens (5 males and 3 females) of the series, apparently all entitled to be classed as adult, measure as follows: Total length, 143.6 (134–150); tail vertebræ, 22.3 (20–25); hind foot, 19.9 (18.5–22); ear, 11.5 (10–13). Three additional females that appear to have suckled young range in total length from 124–129, with the other measurements proportional.

This species differs considerably in color from either *L. trimucronatus* or *L. alascensis*, and still more in cranial details.

Of this species Mr. Anderson says: "The short-tailed yellowish voles taken at Telegraph Creek inhabited a long, rather dry little valley near the top of the 'Summit.' At the time I attempted to trap them, a light snow fell during the first night, and in the morning we saw a number of places where these animals had burrowed through the snow and made long winding trails to the surface, not merely tracks, but trails, as if they had dragged their bodies through the soft snow. I followed one of these for more than twenty yards. It ended in a little tunnel in the snow." At Level Mountain he says: "The small number of the short-tailed yellowish voles which I took here was from holes beneath rocks imbedded in the moss and lichen in places back from the streams, but nevertheless often very damp."

The following schedule is of interest as showing the relative abundance of the different species of Muridæ at the five principal localities in the Telegraph Creek region where collections were made, as from Mr. Anderson's report it is evident that the collecting was indiscriminate at each of the localities. The time spent at each was of course unequal, but the ratio of abundance, as indicated by the specimens taken, is not thereby affected.

	Telegraph Creek.[1]	Cheonnee Mts.[2]	Shesley River.[3]	Level Mt.[4]	Raspberry Creek.[5]
Mus musculus	3	—	—	—	—
Peromyscus arcticus	272	4	3	3	10
" oreas	—	1	—	—	—
Neotoma saxamans	41	—	—	2	2
Evotomys dawsoni	5	11	—	42	9
Microtus vellerosus	38	1	1	6	5
" drummondi	1	3	4	30	—
Fiber spatulatus	—	—	1	seen	seen
Phenacomys constablei	8	1	1	1	—
Synaptomys andersoni	—	—	—	1	—
Lemmus helvolus	28	—	1	11	1

[1] July 11–18, July 27–Aug 17, Oct. 17–20.
[2] July 21–25.
[3] Aug. 23–Sept. 6.
[4] Sept. 10–21.
[5] Oct. 4–13.

26. **Zapus saltator** *Allen.* Stickine Jumping Mouse.

Zapus saltator Allen, Bull. Am. Mus. Nat. Hist., XII, 1899, 3. March 4, 1899. Telegraph Creek, B. C.

Five specimens, taken as follows: Telegraph Creek, July 26 and August 13 and 15; Shesley, September 5 (2 specimens). Two of the Telegraph Creek skins were later destroyed by mice, but the skulls and measurements remain.

The yellow in the July specimen is rather paler and the back less dark than in the September examples, the former being in breeding pelage and the latter in fall pelage. An adult male and an adult female measure respectively as follows: Total length, ♂, 240, ♀, 234; tail vertebræ, 145, 149; hind foot, 32.5, 33; ear, 16, 15.

27. **Erethizon epizanthus nigrescens,** subsp. nov. Dusky Porcupine.

Type, No. 20772, ♂ ad., Shesley River, August 23; M. P. Anderson.

General coloration above black, lighter on the nape, sides of lower back, and thighs, where the tips of the hairs are yellowish; beneath uniform sooty black. Whole front and sides of the head sooty black, with a few white-tipped hairs on the nose; over the top of the head and nape, the long hairs are broadly tipped with pale yellow; over the shoulders and greater part of the back they are nearly all wholly black, a very few showing a slight tipping of yellowish; over the hinder back, rump, and median area of the tail the long hairs are wanting, but the spines are still wholly concealed by the long black underfur; the thighs and sides of the tail have the long black hairs broadly tipped with yellowish white. The spines, which show very plainly through the pelage on the sides of the shoulders, flanks, and thighs, are white, pointed with plumbeous over the shoulders and with blackish elsewhere.

Measurements (type). — Total length, 740: tail vertebræ, 210; hind foot, 90; ear, 27. Skull: Total length, 105; basal length, 99; zygomatic breadth, 67; mastoid breadth, 42; nasals, ? (broken away); upper molar series, 26. An adult female skull measures: Total length, 104; basal length, 98; zygomatic breadth, 71; interorbital breadth, 29; mastoid breadth, 45; nasals, ? (imperfect); upper molar series, 28.

Represented by two skins with skulls and two additional skulls. The extra skulls are from Level Mountains, and the

two skins, respectively, from Telegraph Creek, August 31, and Shesley River. The Shesley River skin is much the younger of the two, and in better pelage; the general coloration is less dark, owing to the greater abundance of long hairs, which are more broadly tipped with pale yellowish white.

Compared with Dr. Merriam's description of *E. epizanthus myops* from the Alaska Peninsula, and with a very fine large November specimen from Kenai Peninsula, the present form differs strikingly in its very much darker coloration and the much paler tips of the long hairs, which are pale yellow instead of deep yellow. The skulls of porcupines differ so greatly with age and individually, and the material for comparison is at present so scanty, that no very positive cranial differences are apparent. The four skulls of the present series, however, agree in possessing a very marked depression of the top of the skull at the fronto-parietal region, and in the great development of the lateral border of the interorbital region, which, just behind the orbits, forms a high obtuse knob, thus greatly emphasizing the fronto-parietal depression. In an equal number of Alaska skulls referable to *myops* both these features are practically absent.

"Porcupines are not infrequent near Telegraph Creek, though we took but one specimen." The same report is made for the camps at the head of Shesley River and Table Mountain.

28. **Lepus saliens** *Osgood.* Lake Bennett Hare.

Lepus saliens Osgood, N. Am. Fauna, No. 19, Oct. 6, 1900, 39. "Caribou Crossing, between Lake Bennett and Lake Tagish, Northwest Territory, Canada."

Two adult specimens, male and female, Telegraph Creek, October 20 and 21. Both are in change from summer to winter pelage, the female retaining the summer coat except on the ears and feet, which have turned white. The male specimen is a little more advanced in change, the ventral surface, rump, and flanks having become white as well as the ears and feet.

Summer pelage. — Female, No. 20770. Dusky gray brown, copiously varied with black; the underfur is pale plumbeous tipped with wood brown; the longer hairs are plumbeous for their basal half, then broadly ringed with pale wood brown and tipped with black. Lower back blackish; head brighter than the back, the hairs ringed subapically with rusty brown instead of pale wood brown. Prepectoral band very broad, rusty buff.

The male is similar in coloration where the summer coat still remains, the back being gray brown varied with black, and the top of the head rusty brown.

Measurements. — The external dimensions as taken by the collector are as follows: Total length, ♂, 455, ♀, 475; tail vertebræ, 40, 40; hind foot, 135, 130; ear, 74, 75. Skull: Occipital-nasal length, ♂, 74, ♀, 77.5; greatest zygomatic breadth, 38, 37; length of nasals, 27.5, 30; greatest width of nasals, 15, 14; alveolar length of molars, 13, 14.3.

If these specimens are correctly referred to *L. saliens*, the total length of the type of the species, "measured from dry skin," is apparently much too small (395 mm. as against 455 and 475 in the present specimens), as the other measurements conform satisfactorily with the Telegraph Creek specimens.

Although hares "were said to be not uncommon at Telegraph Creek," the "two specimens brought in on October 20 and 21" were the only examples secured.

29. **Phoca richardii pribilofensis** *Allen.* Pribilof Harbor Seal.

Phoca richardii pribilofensis Allen, Bull. Am. Mus. Nat. Hist., XVI, 1902, 495. Dec. 12, 1902. Pribilof Islands, Alaska.

One skull, adult male, from the western end of the Alaska Peninsula. Total length of skull, 209; zygomatic breadth, 130.

30. **Canis occidentalis** (*Richardson*). Gray Wolf.

Canis lupus, occidentalis Richardson, Fauna Bor.-Amer., I, 1829, 60, 62. "Northern Wolf of America."

One specimen, old female, Little Tahltan River, August 17. Length, 2642; tail vertebræ, 406; hind foot, 254. Skull, total length, 200; zygomatic breadth, 127. General color

pale yellowish white, strongly varied with black over the whole dorsal area, where black is the prevailing color, including upper surface of tail; top and sides of head, from the eyes posteriorly, lighter, gray varied with black, the nose reddish brown, varied with black; ears externally ochraceous rufous, varied on the apical half with black, and whitish internally; fore limbs ochraceous buff, brightest externally; hind limbs similar but much paler.

31. **Vulpes alascensis abietorum** *Merriam.* Fir Fox.

Vulpes alascensis abietorum Merriam, Proc. Wash. Acad. Sci., II, 669. Dec. 28, 1900. Stuart Lake, B. C.

A young female, skin and skull, Level Mountain, September 12. This specimen is so young that it still retains the milk dentition. Consequently its relationship cannot be satisfactorily determined. It is referred here on geographical grounds.

32. **Ursus middendorffi** *Merriam.* Kadiak Bear.

Ursus middendorffi Merriam, Proc. Biol. Soc. Wash., X, 69, April 13, 1896. Kadiak Island, Alaska.

Represented by 30 skulls from Kadiak Island, varying in age from young still retaining part of the milk dentition to very old males and females. Four of the largest old male skulls measure as follows: Total length (front of premaxillaries to end of occipital crest), 428 (408–440); basal length (gnathion to posterior border of occipital condyles), 402 (390–408); zygomatic breadth, 291 (282–303); interorbital breadth, 97.5 (94–100); width across postorbital processes, 138 (132–142). A large 'young adult' male (all the sutures still open): Total length, 405; basal length, 392; zygomatic breadth, 230; interorbital breadth, 86; postorbital processes, 116. Four other smaller but very old skulls, presumably females, measure: Total length, 366 (350–380); basal length, 336 (312–350); zygomatic breadth, 224 (220–227); interorbital breadth, 86 (83–91); postorbital processes, 122 (120–126).

33. **Ursus sitkensis** *Merriam.* Sitka Bear.

Ursus sitkensis Merriam, Proc. Biol. Soc. Wash., X, 73, April 13, 1896. Coast, near Sitka, Alaska.

A single skull, obtained at Sitka.

34. **Ursus horribilis** *Ord.* Grizzly Bear.

Ursus horribilis Ord, Guthrie's Geogr., 2d Am. ed., II, 1815, 291, 299. Montana (Merriam).

An old female and a male cub, skins and skulls, Shesley Mountains, September 2. The old female measures: Total length, 1626; tail vertebræ, 146; hind foot, 292. Skull: Total length, 332; basal length, 313; zygomatic breadth, 192; interorbital breadth, 75; postorbital processes, 105.

35. **Ursus americanus** *Pallas.* Black Bear.

Ursus americanus Pallas, Spic. Zoöl., fasc. xiv, 1780, 5.

An old male, skin and skull, Shesley Mountains, August 27. Total length, 1524; tail vertebræ, 152; hind foot, 229. Skull: Total length, 260; basal length, 252; zygomatic breadth, 170; interorbital breadth, 69; postorbital processes, 99.

36. **Putorius cicognanii richardsoni** (*Bonaparte*). Richardson Weasel.

Mustela richardsoni Boneparte, Charlesworth's Mag. Nat. Hist., II, Jan., 1838, 38. "North America" (Great Bear Lake, *apud* Bangs).

This animal is represented by 7 specimens, 5 males and 2 females, taken as follows: 6 specimens (4 males, 2 females), Telegraph Creek, August 11–15; 1 male, Level Mountain, September 17. They vary considerably in depth of color, some being much lighter than others, even when taken at the same place, on the same day. An examination of the skulls shows that in the case of both males and females, the palest specimens are very old adults and the darker ones young adults. One specimen (one of the oldest) differs from all the others in having no white on the hind feet and barely a trace of white on the fore feet.

The five males measure as follows: Total length, 330.5 (302–348); tail vertebræ, 99.5 (94–108); hind foot, 43.5 (41–46); ear, 20.5 (20–21.5). The two females measure respectively: Total length, 265, 250; tail vertebræ, 80, 70; hind foot, 34.5, 32; ear, 16, 16.

Four of the specimens are almost pure white below and the other three show a decided tinge of yellow.

37. **Putorius microtis,** sp. nov. SMALL-EARED WEASEL.

Type, No. 19964, ♂ ad., Shesley, September 24; M. P. Anderson.

Similar in coloration, including the white on the feet, to *Putorius c. richardsoni*, but very much smaller, with very small ears and very pronounced cranial characters.

Above dark brown, with a slight tinge of golden, but not very decidedly different from yellowish-brown specimens of *richardsoni;* below white, with a strong tinge of sulphur yellow; extent of white on the toes of both fore and hind feet about as in average specimens of *richardsoni*. Ears very small, 2 mm. less in height, and in general size one-half less than in *richardsoni*.

Skull. — Rostral and interorbital portions of the skull very broad, the nasals broader than in the much larger *richardsoni;* zygomata, weak, uniformly curved outwardly; postpalatal fossa small, narrow U-shaped; audital bullæ small, flat, very little inflated in comparison with *richardsoni*, the small development of the bullæ coördinated with the small external ear.

Measurements. — Total length, 295; tail vertebræ, 82; hind foot, 37; ear from crown, 19 mm. Skull: Total length, 40; zygomatic breadth, 20.5; length of nasals, 7; width of nasals at middle, 3.5; length of palate, 14; interorbital breadth, 9; postorbital breadth, 9.5; breadth across postorbital processes, 11; mastoid breadth, 14; breadth of skull across audital bullæ, 19; length of audital bullæ, 12; width of bullæ, 7; height of bullæ above postpalatal floor, 1.6; length of premolar-molar series, 9; length of lower jaw, 20; height at coronoid process, 9. The size of the skull is intermediate between that of male and female skulls of *richardsoni*, male skulls of *richardsoni* of exactly corresponding age having a length of 45 mm. as against 40 in the present species and 35 in the female of *richardsoni*.

Represented by a single adult male taken at Shesley, British Columbia, September 24.

While similar in coloration to *Putorius richardsoni*, it is

readily distinguished externally by the very small ears. Its very distinctive cranial features render further comparison with allied species unnecessary.

This weasel was trapped by Mr. Anderson "in the same bunch of balsam firs where the bushy-tailed rats were secured."

38. **Gulo luscus** (*Linn.*). WOLVERINE.

An adult female, from Oizenoy Bay, Alaska Peninsula, June 7. Total length, 965; tail vertebræ, 229; hind foot, 178. Skull, naso-occipital length, 148; basal length, 135; zygomatic breadth, 96; interorbital breadth, 39; breadth of postorbital constriction, 34.

39. **Sorex personatus** *I. Geoffroy.* MASKED SHREW.

This species is represented by 34 specimens, collected as follows: Telegraph Creek, 21 (13 skulls and skins, and 8 additional skulls with field measurements), August 2 to 15 and October 19; Little Tahltan River, 1, August 18; Level Mountain, 2, September 15; Raspberry Creek, 9, October 7; and Sheep Creek, 1, October 14.

The Telegraph Creek and Raspberry Creek series measure as follows: Telegraph Creek, 20 specimens: Total length, 99.6 (96–104); tail vertebræ, 40.4 (37–44); hind foot, 11.9 (11–13); ear, 7.6 (7–8). Raspberry Creek, 9 specimens: Total length, 100 (96–105); tail vertebræ, 40.8 (40–42); hind foot, 11.9 (11–12); ear, 7.5 (6–8).

I also refer to this species 2 specimens taken by Mr. A. J. Stone on previous trips, as follows: Liard River, 1 specimen, Nov. 27, 1897; Fort Norman, 1 specimen, Sept. 17, 1898. From its very dark color the first mentioned of these two examples was formerly referred (this Bulletin, XII, 1899, p. 9) provisionally to *Sorex sphagnicola* Coues, but both agree well with the present species, and are too small to meet the requirements of *S. sphagnicola.*

The specimens from the Telegraph Creek region do not differ appreciably from specimens from northern Maine and New Brunswick.

40. **Sorex personatus streatori** *Merriam.* STREATOR SHREW.

Sorex personatus streatori MERRIAM, N. Am. Fauna, No. 10, Dec. 31, 1895, 62. Yakutat, Alaska.

Represented by 7 specimens from Wrangel Island, June 27 to July 7, and 2 from Kupreanof Island, November 3, the latter being in the plumbeous autumn pelage. The Wrangel Island specimens agree within about a millimeter with the measurements given by Dr. Merriam (N. Am. Fauna, No. 10, 1895, p. 63) for a series of 7 specimens from the same locality, Mr. Anderson's measurements being as follows: Total length, 107 (104–114); tail vertebræ, 45 (44–47); hind foot, 13.1 (13–13.5); ear, 7.7 (7–8.5). The Kupreanof specimens are slightly smaller and apparently less mature.

41. **Sorex obscurus** *Merriam.* MOUNTAIN SHREW.

Sorex vagrans similis MERRIAM, N. Am. Fauna, No. 5, Aug., 1891, 31, pl. iv., fig. 3. Salmon River Mountains, Idaho.

Sorex obscurus MERRIAM, N. Am. Fauna, No. 10, Dec. 31, 1895, 72 = *S. v. similis*, the name *similis* being preoccupied.

Represented by 33 skins and skulls and 7 additional skulls (with field measurements) collected at the following localities: Telegraph Creek, 10 specimens, July 15 to August 15; Cheonnee Mountains, 4, July 22–25; Shesley River, 4, August 23–31; Little Tahltan River, 1, August 18; Level Mountain, 4, September 15; Raspberry Creek, 10, October 7–13.

The Raspberry Creek series is in the ash gray pelage of winter, and thus contrasts strongly in color with all the others, which are in the brown pelage of summer. This series also averages slightly smaller in all of the measurements than those from the other localities, as shown by the following:

Telegraph Creek, 10 specimens: Total length, 112.9 (110–115); tail vertebræ, 45.3 (43–48); hind foot, 13 (12.5–13.5); ear, 8 (7–8.5).

Shesley River, 6 specimens: Total length, 115.3 (111–121); tail vertebræ, 45.6 (43–48); hind foot, 13 (12.5–15); ear, 8.6 (7.5–9).

Raspberry Creek, 10 specimens: Total length, 109.7 (102–

115); tail vertebræ, 44.3 (42–49); hind foot, 12.6 (12–13); ear, 7.8 (7–9).

Mr. Anderson states that the shrews were usually taken "where there was a growth of moss and lichens in moist places," or "in moist green spots near water," or "in groves of firs and pines, when the moss-covered ground was always damp."

42. **Sorex longicauda** (*Merriam*). Long-tailed Shrew.

Sorex obscurus longicaudata Merriam, N. Am. Fauna, No. 10, Dec. 31, 1895, 74. Wrangel, Alaska.

Represented by 20 specimens (topotypes) from Fort Wrangel, taken June 25 to July 7, of which 2 are males and 18 females. The 2 adult males measure respectively: Total length, 132, 137; tail vertebræ, 56, 58; hind foot, 15, 16; ear, 8, 8. The 11 adult females measure: Total length, 129 (122–138); tail vertebræ, 56 (53–59); hind foot, 15.2 (14.5–16); ear, 8 (7.5–8.5). The series is very uniform in coloration, both above and below.

Four of the six November specimens of *Sorex* from Kupreanof Island (near Wrangel Island), taken November 3, 4, and 8, are also referred to this subspecies. They differ, however, in color from the Wrangel June-July series in being dusky plumbeous above, and in showing only a slight trace of a buffy wash on the gray of the ventral surface. Two of the specimens are moulting, apparently into the plumbeous coat from the brown dress of the breeding season.

This species differs from *S. obscurus* in its considerably larger size and more brownish coloration, particularly through the brownish wash of the ventral surface.

Mr. Anderson states that these specimens were "usually trapped under damp, overhanging mossy banks, or about the roots of up-turned stumps."

[**Sorex richardsoni** *Bachman.* Saddle-backed Shrew.

Three specimens of this species, not previously recorded, were taken by Mr. A. J. Stone at Fort Norman, Mackenzie

River, September 15, 16, and 17, 1898. This greatly extends to the northward the previous known range of the species, which has not been previously recorded from north of Edmonton, Alberta.]

43. **Sorex (Neosorex) palustris alaskanus** (*Merriam*). Alaska Water Shrew.

Sorex navigator alaskanus Merriam, Proc. Wash. Acad. Sci., II, 1900, 18. March 14, 1900. Point Gustavus, Glacier Bay, Alaska.

Two specimens, skins and skulls (male and female), and an additional skull (female). Total length, ♂, 148, ♀, 154, ♀, 157; tail vertebræ, 68, 74, 74; hind foot, 19, 19, 20; ear, 7, 8, 6.5.

Mr. Anderson says: "I secured three specimens of a large dark gray shrew with silvery underparts, from the banks of Telegraph Creek, where there was a dense growth and the ground was always moist."

Vespertilionidæ. Bats.

"During July a few small bats were seen flying about the village of Telegraph, but none were secured." (Anderson, MS. notes.) Mr. Osgood (N. Am. Fauna, No. 19, 1900, p. 45) occasionally met with small bats between Caribou Crossing and Fort Selkirk, Alaska. The specimens obtained proved referable to *Myotis lucifugus* (Le Conte).

Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. December, 1901. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. 1–28. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881–86.....	Price, $5.00	Volume XI, Part I, 1898,	Price, 1.25
" II, 1887–90.....	" 4.75	" " " II, 1899	" 2.00
" III, 1890–91.....	" 4.00	" " " III, 1900	" 2.00
" IV, 1892	" 4.00	" " " IV, 1901	" 1.75
" V, 1893	" 4.00	" " (Complete).	" 5.00
" VI, 1894	" 4.00	" XII, 1899.....	" 4.00
" VII, 1895	" 4.00	" XIII, 1900.....	" 4.00
" VIII, 1896.....	" 4.00	" XIV, 1900.....	" 4.00
" IX, 1897.....	" 4.75	" XV, Part I, 1901	" 3.00
" X, 1898.....	" 4.75		

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILIÈRLE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

(*Continued on 3d page of cover.*)

List of Mammals Collected by Mr. J. H. Batty in New Mexico and Durango, with Descriptions of New Species and Subspecies.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XIX, Article XXIV, pp. 587–612.

New York, November 12, 1903.

The Knickerbocker Press, New York

Article XXIV. — LIST OF MAMMALS COLLECTED BY MR. J. H. BATTY IN NEW MEXICO AND DURANGO, WITH DESCRIPTIONS OF NEW SPECIES AND SUBSPECIES.

By J. A. Allen.

The present collection was made for the Museum by Mr. J. H. Batty, mostly during the present year. During December, 1902, he collected in Donna Ana County, New Mexico, near the southern border, at localities less than one hundred miles west of El Paso, Texas. Early in January he went to the northwestern corner of the State of Durango, Mexico, where he continued his work till August, 1903, exploring the arid foot-hills and plains at the eastern base of the Sierra Madre, from the southern boundary of Chihuahua southward. The localities visited are embraced within an area of about one hundred square miles, and range in altitude from 6800 to 8500 feet. The region was practically unworked, and is somewhat distant from any point where thorough collecting had previously been done. The mammalian fauna is scanty, but proves unexpectedly rich in new forms, and in respect to coloration and some other features the species present, in general, distinctive peculiarities.

In general facies the fauna of this region more closely resembles that of the southern border of Arizona than it does that of the upper Rio Grande region of Texas and New Mexico. The thoroughness with which Mr. Batty worked is attested by a collection of about 600 specimens, numbering 34 species, many of which are represented in large series. The record of specimens given under each species doubtless fairly indicates their relative abundance.

The specimens collected in New Mexico proved of great interest for comparison with those from Durango, and in every case the forms inhabiting the two regions proved readily distinguishable. It was expected that the Durango forms would in most instances prove identical with species and subspecies

inhabiting the southern border of Arizona, but careful comparison, with the aid of abundant material, shows that such reference would in most cases fail to express their true relationships.

I am indebted to the kindness of Dr. A. K. Fisher, Acting Chief of the U. S. Biological Survey, and to Mr. Gerrit S. Miller, Jr., Assistant Curator of Mammals, U. S. National Museum, for the loan of topotypes of various species for use in the present connection.

[Note. — The measurements taken by the collector from the fresh specimens are as follows: (1) Head and body; (2) tail vertebræ; (3) hind foot, measured to end of longest toe (after the British Museum method), and hence not including the claw; (4) ear, measured from the notch instead of from the crown, except in a few cases, as in the hares, where both are often given. For convenience in comparison the total length is here also given, made up by adding the collector's first two measurements.]

I. Donna Ana County, New Mexico.

The specimens here recorded, about 150 in number, were all taken during the month of December (Dec. 6–26), along the southern border of Donna Ana County, a little west of El Paso.

1. **Citellus (Otospermophilus) grammurus** (*Say*).

One specimen, collected at Chamberino. "Not common."

2. **Peromyscus tornillo** *Mearns.*

Ten specimens: Guadalupe Ranch, 1, Dec. 3; La Mesa, 8, Dec. 13–17; Chamberino, 1, Dec. 26.

Seven adults (4 males and 3 females) measure as follows: Total length, 169 (163–171); head and body, 93 (90–95); tail vertebræ, 75.5 (73–76); hind foot (without claws), 20.6 (19–22); ear, 18.1 (18–18.3).

3. **Sigmodon hispidus berlandieri** (*Baird*).

Nine specimens, collected as follows: Guadalupe Ranch, 4, Dec. 13–16; La Mesa, 1, Dec. 19; Chamberino, 4, Dec. 26.

Only two are fully adult, both males, and measure, respectively: Total length, 248, 229; tail vertebræ, 102, 89; hind foot (without claws), 19, 19.

4. **Neotoma mexicana** *Baird.*

Forty-eight specimens, taken as follows; Guadalupe Ranch, 18, Dec. 8–13; La Mesa, 28, Dec. 13–18; Chamberino, 2, Dec. 25 and 26. Nearly one half are fully adult, one is in the plumbeous pelage of the young, and the rest range from half or two thirds grown to nearly adult.

Nine adult males from the La Mesa series measure: Total length, 324 (311–337); head and body, 180 (171–191); tail vertebræ, 145 (137–152, with 1 at 121 and 1 at 165); hind foot (without claws), 32.5 (32–36); ear (from notch), 27 (25–29). Five adult males from Guadalupe Ranch: Total length, 329 (305–347); head and body, 185.3 (172–197); tail vertebræ, 133 (127–140); hind foot, 32.8 (31.5–34); ear, 27 (25.5–29). Three females from La Mesa: 312 (305–319); 172 (165–179); 140 (140–140); 32 (32–32); 27 (25.5–28.5). Four females from Guadalupe Ranch: 298 (286–311); 170 (159–184); 128 (127–130); 32 (32–32); 26.3 (25.5–29).

5. **Lepus (Macrotolagus) texianus griseus** *Mearns.*

Represented by 17 specimens (7 males and 10 females), collected as follows: Guadalupe Ranch, 11, Dec. 6–12; La Mesa, 4, Dec. 16–20; Chamberino, 2, Dec. 27.

Ten females measure as follows: Total length, 560 (546–615); head and body, 469.5 (438–527); tail vertebræ, 82 (70–94); hind foot (without claws), 127.6 (114–145); ear from notch, 130 (124–140); ear from crown, 160 (156–162). Six males: Total length, 564 (432–626); head and body, 453 (432–528); tail vertebræ, 83 (70–98); hind foot (without claws), 131 (114–140); ear (from notch), 131 (121–138).

The specimens, all adult and in full winter pelage, vary but little in coloration; in a small percentage the back is much more strongly varied with black than the others; the gray of the upper parts is decidedly more tinged with brownish ful-

vous in some than in others, and, correlated with this, the sides are more strongly tinged with fulvous.

Lepus texianus griseus is very closely related to *L. t. eremicus* Allen, from the southern border of Arizona; it is a little grayer (the dorsal area less suffused with brownish), but in size and proportions there is apparently little, if any, difference.[1]

6. Lepus (Sylvilagus) arizonæ minor *Mearns.*

Represented by 37 specimens, all adult, collected as follows: Guadalupe Ranch, 22, Dec. 6–12; La Mesa, 7, Dec. 17–20; Chamberino, 8, Dec. 25–27.

Twelve males measure: Total length, 343 (310–361); head and body, 323.5 (292–327); tail vertebræ, 40 (35–44); hind foot, 77 (70–82); ear from notch, 65.4 (63.5–70). Ten females: Total length, 347 (307–378); head and body, 324 (306–330); tail vertebræ, 41 (35–44); hind foot, 76 (70–83); ear from notch, 66 (60.5–70).

7. Lynx ruffus texensis (*Allen*).

One specimen, adult female, Guadalupe Ranch, Dec. 6. Total length, 863; head and body, 711; tail vertebræ, 152; hind foot, 140.

II. Northwestern Durango.

The principal localities (mostly not on ordinary maps), with the dates during which collections were made, are as follows: (1) Rosario, altitude 7500 feet, on the Rio Florida, at the terminus of the Parral branch of the Mexican Central Railroad; Jan. 21–28. (2) Mount San Gabriel, altitude 7000 to 9000 feet; Jan. 28. (3) Rio del Bocas, a dry river bottom on the Rio Florida, altitude 6800 feet; Feb. 8–13. (4) Villa Ocampo, or Ville de Campo, a few miles below Rio de Bocas, on the Rio Florida, altitude 7000 feet; Feb. 11–13. (5) La Boquilla, a pass in the San José Mountains, at 7000 feet; Feb.

[1] I take this opportunity to correct an error in the original description of *L. t. eremicus* (this Bulletin, VI, 1894, p. 348, last paragraph of the description), where, through some inadvertence not now explicable, the measurements are quite wrong. The measurements given for the type (*l. c.*, p. 347) are correct, and the correct measurements of the series of 8 specimens will be found in Vol. VII, p. 202, *op. cit.*

14–16. (6) San Gabriel, a small adobe village, seventy miles northwest of Inde, in the plains, altitude 7000 feet; Feb. 17–20. (7) Rancho Santuario, an old "Spanish Grant" ranch, on the plains, altitude 7000 feet; Feb. 17–March 11. (8) Matalotes, at the head of the Arroyo Matalotes, at the base of the Sierra Madre, altitude 8000 feet; March 20–24. (9) Cienega de las Vacas, at base of Sierra Madre, altitude 8500 feet; April 6. (10) Rio Sestin, altitude 7500 feet—one of the most fertile valleys of the region; April 9–May 4. (11) Rancho Bailon, altitude 7800, in the foot-hills of a small range of mountains overlooking the Sestin Valley from the east, May 5–14. (12) Arroyo de Bucy, altitude 7500 feet, a deep rocky cañon in the Sierra del Candella; May 22–30. Very few of the specimens collected after June 1 have as yet come to hand.

1. **Odocoileus**[1] **battyi,** sp. nov.

Type, No. 21277, ♂ ad., Rancho Santuario, northwestern Durango, March 10; J. H. Batty, for whom the species is named.

Similar in size and coloration to *O. couesi*, but with strongly marked cranial differences.

General color (winter coat, type specimen) of upper parts gray brown, darker on top of head and along median line to base of tail, lighter on flanks; below, middle of throat white, passing into pale grayish brown on sides of throat and cheeks and posteriorly over fore neck and chest, which is darker, most of the hairs being tipped with blackish brown; lower breast, axillæ, and inside of fore legs white to hoofs, which are encircled with a band of white; middle of ventral surface grayer and slightly suffused with pale buff, passing into clear white on lower part of abdomen, inguinal region, inside of thighs, and inside of hind leg to tarsal gland, which is white with a central disc of deep orange chestnut; a narrow band of whitish encircling the hoofs, broadest and clearer white on the posterior aspect; ears thinly haired, gray brown externally, rather darker than the back, but not edged nor tipped with blackish, and clothed thinly internally with long white hairs; sides of nose with a patch of black, often connected across the middle and forming a distinct nose band; also a blackish spot, often faintly marked, on each side of the lower lip, near the middle, the two

[1] I am informed by Dr. T. S. Palmer that the generic name *Dama* Zimmermann (1777), recently adopted by me for the present group (this Bulletin, XVI, 1902, p. 19), is preoccupied through its previous use by Frisch (1775) for the *Cervus dama* of Europe.

sometimes uniting to form an indistinct band; tail basally above colored like rump, the upper surface with the hairs dark brown basally and tipped with white, the dusky basal portion showing through and giving the whole upper surface of the tail a grizzled white and brown effect; edges and lower surface clear white; posterior border of rump with a heavy fringe or ruff of white.

The above is about the average coloration of the series, but quite a number of the specimens have the gray brown of the upper parts paler, with a faint buffy tinge, decidedly apparent on the throat, lower edge of flanks, and whole pectoral region. In such specimens the upper surface of the tail is deep ochraceous, almost to the base of the hairs, the basal third of the hairs being yellowish brown. The fringe bordering the rump is mixed yellow and white, and the light inner surface of the limbs is also more or less suffused with buffy. Between these extremes there is every stage of gradation, which is especially striking in respect to the upper surface of the tail. In only a small portion of the specimens is the upper surface of the tail either dusky gray or yellowish, varying from the former through a faint tinge or mixture of yellow hairs to wholly yellow, deepening in some to orange ochraceous; nearly two thirds of the specimens have the dorsal aspect of the tail more or less conspicuously yellow.

Measurements. — An adult male,[1] total length, 1574; head and body, 1371; tail vertebræ, 216; ear, from crown, 190, from notch, 160. Five males, mostly middle-aged: Total length, 1460 (1237–1574); head and body, 1253 (1031–1371); tail vertebræ, 221 (215–229); ear from crown, 189 (178–198); ear from notch, 161 (152–168). Seven adult females: Total length, 1294 (1210–1371); head and body, 1081 (1007–1168); tail vertebræ, 208 (203–228); ear from crown, 176 (165–185); ear from notch, 157 (146–165).

Skull. — The skull is relatively much shorter and broader than in *O. virginianus*, with very much shorter and broader nasals, and very much smaller antorbital vacuities, but with the lachrymal pit shallow and imperforate,— not deep and perforate as in *O. couesi*. Compared with *O. couesi*, the antorbital vacuities are nearly one half smaller; the nasals are very much broader and less arched, with their greatest expansion generally at their posterior third instead of at the middle as in *O. couesi;* the walls of the posterior nares are more extended posteriorly and the narial opening is more vertical; the basisphenoid is more cuneate, through its greater expansion posteriorly; the dentition is very much heavier; the antlers bend more sharply outward and the outward curvature is nearer the skull.

The type skull, of a fine middle-aged, four-pronged buck, measures

[1] The measurements of the type are not recorded in the collector's field catalogue. Also the measurements of the hind foot are not available, having been taken from the metatarsal instead of the tarsal joint.

as follows: Total length, 248; occipito-nasal length, 201; basal length of Hensel, 220; zygomatic breadth, 115; least interorbital breadth, 61.5; mastoid breadth, 85.5; greatest length of nasals, 77; greatest width of nasals, 31; length of upper premolar-molar series, 69.5; length of lower jaw (from angle to outer base of middle incisors), 192; height at condyle, 64; height at coronoid, 96; alveolar length of lower premolar-molar series, 72. The antlers have a moderate bur, are nearly smooth, even proximally; beam round and rather heavy, with the usual basal tine and two points, one a little behind the middle, the other at the beginning of the posterior fourth, which with the tip of the main beam make four points, all rather short and heavy. Length of main beam along external curvature, 353; distance from bur to top of fork of first point in straight line, 71, to second do., 179, from second to third do., 103; length of main beam beyond last point, 98; distance between burs, 56, distance between tips, 218; greatest expanse, inside measurement, 340. Four other males, somewhat younger, have horns of similar character, but of much lighter weight and less developed points.

An adult female skull: Total length, 230; basilar length of Hensel, 203; occipito-nasal length, 190; length of nasals, 72; greatest width of nasals, 21; zygomatic breadth, 96; least interorbital breadth, 56; mastoid breadth, 66.5; length of upper premolar-molar series, 65; length of lower jaw, 176; height at condyle, 57; height at coronoid 86.3; lower premolar-molar series, 71.

Represented by 19 specimens (6 adult and 3 young males, and 9 adult females and 1 young female), collected as follows: Rosario, 2, Jan. 27 and 28; Mt. San Gabriel, 1, Jan. 28; Rancho Santuario, 5, March 10–11; La Cienega de las Vacas, 11, March 26–April 6. There is also an additional skull, "picked up on the plains," which in shape of antlers, the very broad antorbital vacuities, and the perforated lachrymal pit, agrees with *O. couesi* and not with the rest of the series.

Odocoileus battyi closely resembles externally *O. couesi* but differs greatly in cranial details, as above described. All of the deer of the arid regions of Arizona, Sonora, Chihuahua, and Durango, of the *O. virginianus* style of antlers, appear to present great similarity of coloration, but are found to differ in general size, in the size and shape of the antlers, and more or less in cranial characters, when specimens from distant localities are compared. As stated by me long since (this Bulletin, VII, 1895, p. 200), *O. couesi*, as first said by Coues and Yarrow, is the *Cariacus mexicanus* of Baird (excluding his synonyms), but is not the *Cervus mexicanus* of Gmelin and

later compilers. If we admit that Lichtenstein, in adopting the "*Cervus mexicanus* Desm." ("*Cervus mexicanus* Linn. Gm." on his plate) for the deer he described from Mexico, placed the name upon a recognizable basis, as contended by Lydekker (Deer of All Lands, 1898, p. 263) and Osgood (Proc. Biol. Soc. Wash., XV, 1902, p. 88), the name becomes applicable to the white-tailed deer of the Valley of Mexico, which has only a distant relationship to the form here described.[1]

According to Mr. Batty these deer are not a "timber" deer, and frequent only the high, almost treeless mountain tops, like the mountain sheep. They are not very common and are hard to approach, in consequence of the open character of the country.

2. Sciurus apache *Allen.*

Five specimens, all adult, collected as follows: Cienega de las Vacas, 1 male, April 3; Arroyo de Bucy, 1 male, 3 females, May 20–28. They are quite uniform in size as regards the length of the head and body, but the tail varies greatly. The five specimens measure: Total length, 566 (543–591); head and body, 276 (267–286); tail vertebræ, 292 (264–377); hind foot (without claws), 66 (64–70); ear from notch, 32.6 (32–35).

3. Eutamias durangæ, sp. nov.

Type, No. 21410, ♀ ad., Arroyo de Bucy, northwestern Durango, Mexico; J. H. Batty.

Similar to *Eutamias bulleri* from southwestern Zacatecas, but larger and paler, with the white markings on the head broader and the white postauricular patch larger; rump, basal portion of the tail, and flanks faintly suffused with a very pale tinge of buff instead of being gray as in *bulleri;* the dark dorsal stripes are similar in extent and in color, but the intervening light stripes are suffused with pale cinnamon instead of being nearly clear white as in *bulleri*, and the rufous of the flanks is much paler.

[1] As Mr. Osgood (*l. c.*), in his history of the case, shows the validity of the claim that the original *Cervus mexicanus* had no tangible basis, it seems more in accordance with usage in such cases to consider the name *mexicanus* as preoccupied by an indeterminable species, and to recognize the form described and figured by Lichtenstein as entitled to the new name *Odocoileus lichtensteini* which has been bestowed upon it. (*Cf.* Allen, this Bulletin, XVI, 1902, pp. 16 and 20, footnotes.)

Measurements. — Type, total length, 238; tail vertebræ, 98; hind foot (without claws), 32; ear from notch, 19. Nine adult topotypes (5 males and 4 females) measure as follows: Total length, 234 (222–241); head and body, 137.6 (127–140); tail vertebræ, 97.2 (95–102); hind foot, 32.1 (32–33); ear, 19.9 (19–22).

Skull: type, total length, 39; greatest zygomatic breadth, 21. Nine topotypes: Total length, 38.8 (37–40); zygomatic breadth, 20.7 (20–21). Six skulls of *E. bulleri* measure: Total length, 37.5 (37–38.2); zygomatic breadth, 20.1 (20–20.5). (No external measurements of *E. bulleri* are available for comparison, the collector omitting to take measurements before skinning.)

Eutamias durangæ is based on a series of 13 specimens, all adult except two, taken by Mr. Batty at Arroyo de Bucy, in the Sierra del Candella, at an altitude of about 7500 feet, May 22–30. As already noted above, it resembles *E. bulleri*, but is considerably larger, and quite different in coloration, being much lighter colored, with the gray areas faintly suffused with pale buff, and the median white dorsal stripes with a wash of pale cinnamon.

Mr. Batty informs me that this chipmunk is reported to range for some distance to the southward along the eastern base of the Sierra Madre.

4. Citellus (Otospermophilus) grammurus rupestris, subsp. nov.

Type, No. 21231, ♀ ad., Rio Sestin, northwestern Durango, Mexico, April 13, 1903; J. H. Batty.

Front, top, and sides of head and the nape black, a few of the hairs with gray or brownish gray tips, more numerous toward the edges of the black area which is not sharply defined; nose as far back as the eyes and cheeks grayish brown, the hairs being blackish brown at base and broadly tipped with whitish; a patch of whitish above and below the eyes, giving the effect of broad white eyelids; whole upper surface of body varied or ringed with blackish brown and whitish, darkest on the anterior half and lightest on the posterior half of the dorsal region, more or less (often strongly) suffused with yellowish brown; sides lighter and grayer than the median area; underfur black or blackish, and the coarser hairs black basally and at the extreme tip, with a subapical broad band of white or whitish; throat, prepectoral, and axial regions ochraceous buff; rest of ventral surface paler or yellowish buff, the hairs dusky at the extreme base; fore feet yellowish gray; hind

feet more strongly yellowish; ears thinly haired, externally black, internally paler, the tips of the hairs rusty brown; tail above grizzled black and white, becoming darker towards the tip, the hairs individually alternately ringed with black and soiled whitish, there being three bands of each, and tipped broadly with clearer white; lower surface of the tail pale yellowish white, striped on each side with three longitudinal bands of black which increase in width from the inner to the outer, the outer being about twice the width of the inner.

Total length (type), 520; head and body, 279; tail vertebræ, 241; hind foot, to end of toes, 57, to end of claws, 64; ear, 25. Skull: Total length, 66; zygomatic breadth, 40; length of nasals, 23; upper toothrow, 13.

The amount of black on the head varies greatly in different specimens, averaging about as above described, but varying from almost none whatever to specimens in which the hairs are black basally with the tips grayish, and through these to clear brownish black; the black area often extends far down over the nape, and occasionally, as a broad median band, to the shoulders, and in one specimen to the middle of the back.

Doubtless in fresh fall pelage the markings would be about as above described, but with all the tints deeper and hence with greater contrast between the light and dark rings of the individual hairs.

As already indicated, in many specimens the pelage becomes not only exceedingly worn before the post-breeding moult, but greatly faded and discolored, even the underfur, where exposed, changing from black or blackish to yellow-brown. With this moult the ventral surface changes from pale ochraceous to whitish, more or less mixed with dusky, the basal portion of the hairs being dusky with long whitish tips, through which the dusky bases are more or less visible.

Many of the specimens are in greatly worn and discolored pelage, the ends of the hairs over the posterior half of the body having been in some instances wholly worn away, leaving only the fulvous brown bases, the terminal portion bearing the alternating dark and light rings having disappeared. In most of these the moult is in progress, in some the coat having been renewed on the front half of the body.

Citellus g. rupestris is represented by 28 specimens, all adult but 3, which are about two thirds grown, collected as follows: Rio Sestin, 18, April 12–19; Rancho Bailon, 10, May 5–11. Throwing out the young examples, and two with defective tails, the remaining 23 measure as follows:

Nine males: Total length, 503 (451–540); head and body, 277 (241–298); tail vertebræ, 233 (210–248); hind foot (without claws), 56.7 (55.5–57); ear, from notch, 26.3 (25–28). Fourteen females: Total length, 499 (463–521); head and body, 272 (254–293); tail vertebræ, 227 (203–241); hind foot, 56 (54–60); ear, 26.3 (25–29).

The two extremes are both old males and measure respectively: Total length, smallest, 451, largest, 540; head and body, 241 and 298; tail vertebræ, 210 and 248; hind foot, 57 in both; ear, 25 and 28. The females average slightly smaller than the males, and present a much less range of variation, none being nearly as small as the smallest male, nor are any as large as the largest males.

This subspecies most resembles *C. grammurus*, but differs from it in being larger, in having the crown and nape (usually) black, the shoulders and sides less white, and the ventral surface deep buff. It is characterized also by a larger and much heavier skull, with heavier dentition. It is very distinct from *C. variegatus* of the Valley of Mexico and contiguous areas, which is a much darker animal throughout, and also larger, and in which the dark crown patch is only incipiently developed. It is more than probable, however, that the whole series of line-tailed spermophiles, from the Valley of Mexico northward to Colorado, will prove to be intergrading forms of the long-known *grammurus* group, as suggested by Mr. Nelson in his note on Erxleben's *Sciurus variegatus*.[1]

At first it seemed probable that this series of Durango specimens must represent *Spermophilus macrourus* of Bennett (P. Z. S., 1833, p. 41), although Mr. Nelson had synonymized it with *Sciurus variegatus* Erxleben, later (1830) renamed *Spermophilus buccatus* by Lichtenstein. Through the kindness of Dr. A. K. Fisher, Acting Chief of the U. S. Biological Survey, I have before me four typical examples of *Citellus variegatus*, collected by Mr. E. W. Nelson in the Valley of Mexico and the adjoining State of Puebla, and a series of exactly similar specimens from Zapotlan, southern Jalisco, collected for this Museum by Dr. Buller. Bennett's description applies much better to this form than to the Durango specimens, and it seems therefore preferable to consider Bennett's *macrourus* as a synonym of *variegatus*, as Nelson has done, or else to regard it as unidentifiable. The final settlement of the case must rest on an appeal to the type, which may still exist in the British Museum.

[1] Nelson, E. W. What is *Sciurus variegatus* Erxleben? Science, N. S., VIII, No. 208, pp. 897, 898, Dec. 23, 1898.

In addition to the Durango series I find in the Museum collection a single specimen from Guadalupe y Calvo, Sierra Madre, State of Chihuahua, collected in 1893 by Dr. Lumholtz.

None of the many specimens from southern Arizona (White Mts., Chiricahua Mts., Fort Lowell, Fairbank, etc.), nor from Colonia Garcia (in the Sierra Madre of Chihuahua), shows any marked tendency toward the present form, which, doubtless, will be found to occur over a considerable area in Sonora and southern Chihuahua, as well as in Durango.

5. **Mus musculus** *Linn.*

Six specimens: Rosario, 1, Jan. 25; San Gabriel, 2, Feb. 18; La Boquilla, 2, Feb. 16; Rancho Santuario, 1, March 2.

6. **Mus rattus** *Linn.*

Two specimens, Rio del Bocas, Feb. 8.

7. **Mus alexandrinus** *Geoffroy.*

One specimen, Mt. San Gabriel, Jan. 8.

8. **Onychomys torridus** (*Coues*).

Four specimens: Rosario, 1, Jan. 24; Villa Ocampo, 1, Feb. 12; Rio Sestin, 2, April 11 and 21. They do not seem to differ appreciably from specimens from southern Arizona.

9. **Peromyscus paulus,** sp. nov.

Type, No. 21165, ♂ ad., Rio Sestin, northwestern Durango, April 17; J. H. Batty.

Smaller than either *P. musculus* or *P. m. brunneus* and different in color. Upper parts gray brown suffused with pinkish buff; under parts grayish white, the base of the hairs being plumbeous and the tips whitish; in some specimens a faint buffy tinge on the belly.

Measurements. — Type, total length, 108; head and body, 62; tail vertebræ, 44; hind foot, without claws, 13, with claws (from dry skin), 14; ear, from notch, 13, from crown (in dry skin), 11. Seven additional males give practically the same measurements as the type; 6 old females are slightly larger, as follows: Total length, 112 (108–117); tail vertebræ, 44.3 (38–48); hind foot, 13 (12–14); ear, 12 (11–13).

Young specimens in first pelage are gray brown, and young adults are darker and more varied with blackish and less suffused with buff than old adults.

Represented by 20 specimens, collected as follows: Rosario, 1 (young), Jan. 26; San Gabriel, 2, Feb. 18 and 20; Rancho Santuario, 2, Feb. 21 and 27; Rio Sestin, 15, April 9–17.

Peromyscus paulus is a northern representative of the *P. musculus* group, but is very much smaller than either *P. musculus* or *P. m. brunneus*, and differs widely from either in coloration, being lighter or grayer above suffused with pinkish buff instead of dark yellowish brown as in *brunneus* or tawny as in *musculus*. It needs no comparison, however, with *P. taylori*, which is still smaller, with smaller ears, shorter tail, and different coloration.

10. **Peromyscus texanus flaccidus,** subsp. nov.

Type, No. 21064, ♂ ad., Rio Sestin (altitude, 7500 feet), northwestern Durango, April 13; J. H. Batty.

Similar to *P. t. arizonæ*, but slightly paler and rather more fulvous, and also larger with a relatively longer tail and shorter hind foot.

Adult in April, upper parts dark fawn brown, darker over the median area, which is slightly varied with blackish, and lighter, clearer fawn on the sides, defined abruptly against the white of the ventral surface without an intervening fulvous lateral line; head paler and grayer than the body, especially over the whole front of the head; underparts clear white with plumbeous underfur; fore legs white to the shoulder; dark color of body extending narrowly down hind limb to tarsal joint; ears very thinly haired, dark gray brown, slightly margined with whitish; tail bicolor, thinly haired and with no very appreciable pencil, the upper third dark brown, the rest grayish white.

Young adults are dark grayish brown without tinge of fawn; young in first pelage are ashy gray varied with black, much lighter gray than young of corresponding age of either *arizonæ* or *sonoriensis;* ears black with a fluffy whitish gray tuft at anterior base.

Measurements. — Type, total length, 177; head and body, 98; tail vertebræ, 79; hind foot, without claws, 19, with claws, 20; ear, from notch, 18, from crown in dry skin, 14. Twenty-one adults (13 males, 8 females) from Rio Sestin: Total length, 172.8 (159–184); head and body, 95 (83–102); tail vertebræ, 77.3 (70–89); hind foot, 19.3 (19–21); ear, 18.6 (17.5–19).

Nineteen adults of *P. t. arizonæ*, from Fairbank, Arizona, strictly comparable as to season and age, average much smaller, having a total

length of 162 (145–181, only 3 above 170) as against 173 for *flaccidus;* tail vertebræ, 72 (59–80, only 3 above 74) as against 79; hind foot, 22.4 as against 20.5.

Represented by 64 specimens, collected as follows: Rosario, 6, Jan. 24 and 25; Rio de las Bocas, 4, Feb. 8 and 9; Villa Ocampo, 3, Feb. 14; La Boquilla, 1, Feb. 16; San Gabriel, 5, Feb. 17–20; Rancho Santuario, 3, Feb. 21–25; Rio Sestin, 42, April 9–14. Among the April specimens are many young, one quarter to nearly full grown, and the January-February specimens contain a few young adults, but consist mostly of adults, showing that the young are not born till some time in March or later.

This subspecies seems to most resemble *arizonæ* of the *texanus* group, but adults are slightly paler and more fulvous, and young in first coat, as well as young adults, are decidedly paler and more ashy gray. The skulls present no distinctive features, but the differences in size, and especially the longer tail and shorter hind foot, seem noteworthy.

Although a pallid form it differs very appreciably in coloration, and also in size, from *P. t. medius* Mearns from the desert coast belt of northern Lower California.

11. **Peromyscus boylii pinalis** (*Miller*).

Represented by 66 specimens, *all adult*, collected as follows: Mount San Gabriel, 5, Jan. 28; La Boquilla, 6, Feb. 14–16; San Gabriel, 12, Feb. 17–20; Rancho Santuario, 24, Feb. 27–March 7; Matalotes, 7, March 23 and 24; La Cienega de las Vacas, 7, March 21–31 and April 6; Arroyo de Bucy, 3, May 23; without locality, 2, and several additional skulls.

Ten adults from San Gabriel measure: Total length, 190 (181–209); head and body, 90.3 (86–98); tail vertebræ, 99.5 (95–114); hind foot (without claws), 19.4 (19–20.5); ear from notch, 19 (17.5–20.5).

These specimens do not differ appreciably from a large series from the southern border of Arizona, either in size, proportions, or coloration.

12. **Sigmodon minimus** *Mearns.*

Twenty-four specimens, as follows: Rosario, 9, Jan. 21–29; Rio Sestin, 11, April 6–16; Rancho Bailon, 4, May 4–10.

They are mostly young adults, but include 2 middle-aged adults and 1 very old female. If these specimens are rightly referred to *S. minimus*, they show that *minimus* may, when old, attain nearly the size of *S. fulviventer*, from which, however, it differs widely in coloration. The old female and the two middle-aged specimens (male and female) measure, respectively, as follows: Total length, ♀ 269, ♂ 238, ♀ 228; tail vertebræ, 114, 95, 98; hind foot, without claws, 29, 25, 24 (with claws about 3 mm. more); ear from notch, 18, 18, 19.

The Durango series averages rather grayer, with darker (less brownish apically) underfur, than several Arizona specimens available for comparison, and may prove subspecifically separable.

13. Sigmodon baileyi, sp. nov.

Type, No. 20993, ♀ ad., La Cienega de las Vacas (altitude 8500 feet), northwestern Durango, March 27; J. H. Batty.

Pelage rather soft. General color of upper parts gray brown, nearly without fulvous suffusion, the sides faintly tinged with pale buff, the long hairs of back and sides tipped with soiled white, mixed abundantly with black-tipped hairs; underparts white, the basal portion of the hairs ashy plumbeous; *sides of nose conspicuously ochraceous buff;* region at base of tail suffused with cinnamon buff; ears rather dark gray on both surfaces; soft woolly hair at posterior base of ears pale buff; feet pale buffy gray; tail well-haired, bicolor, blackish brown above and all around for apical fourth, pale buffy gray below.

Total length (type), 198; tail, about 90 (slightly imperfect); hind foot (without claws), 25; ear (from notch), 18. Skull, total length, 31.5; basal length of Hensel, 27.3; nasals, 12.5; zygomatic breadth, 18.3; mastoid breadth, 13.3; alveolar length of upper molar series, 5.6.

Represented by 5 specimens: the type, from La Cienega de las Vacas; 3 young adults from Rancho Santuario, Feb. 26 and March 1; and 1 young adult from Arroyo de Bucy, May 30. The type is an adult female that appears to have raised young; the teeth are considerably worn and the skull has well-developed ridges.

Sigmodon baileyi is a very gray, conspicuously yellow-nosed form, apparently closely resembling *Sigmodon hispidus major* in general coloration, but very much smaller—at least one half smaller in general bulk. It belongs to the same group as *Sigmodon hispidus arizonæ* Mearns and *S. h. major* Bailey, which appear to be both specifically separable from true

hispidus, as, respectively, *Sigmodon arizonæ* and *S. a. major*, with which perhaps *S. baileyi* should be associated. Named for Mr. Vernon Bailey, who has done so much to establish order in this very puzzling group.

14. **Reithrodontomys megalotis sestinensis,** subsp. nov.

Type, No. 21175, ♂ ad., Rio Sestin (altitude, 7500 feet), northwestern Durango, April 11; J. H Batty.

Similar in general coloration to *R. megalotis*, but upper parts more strongly varied with black and less fulvous, and with relatively longer tail. Type, total length, 139; head and body, 70; tail vertebræ, 69; hind foot, 18; ear (from notch), 14. An adult female: 139, 69, 70, 18, 14.

Represented by 4 specimens taken as follows: Rosario, 1, Jan. 25; Rio Sestin, 3, April 11–15.

The white underparts and much smaller size distinguish this form from *R. m. obscurus* Merriam, from near Guadalupe y Calvo, Chihuahua, on the western side of the Sierra Madre. While similar in size to *R. m. deserti* Allen, from Nye County, Nevada, it differs from it in much darker coloration.

15. **Neotoma intermedia durangæ,** subsp. nov.

Type, No. 21185, ♂ ad., San Gabriel (altitude, 7000 feet), northwestern Durango, Feb. 20; J. H. Batty.

Externally similar to *Neotoma intermedia albigula* Hartley, but averaging rather larger, with a shorter and broader skull and much heavier dentition.

Measurements. — Type, total length, 356; head and body, 197; tail vertebræ, 159; hind foot, without claws, 32, with claws, 33; ear, from notch, 30, from crown in dry skin, 25. Four additional males: Total length, 345 (330–356); tail vertebræ, 156.5 (152–162); hind foot, 32; ear from notch, 29.5 (29–30). Skull, total length, 45; basilar length of Hensel, 38; length of nasals, 18; zygomatic breadth, 24; width of braincase at posterior base of zygoma, 18.5; mastoid breadth, 18; interorbital breadth, 6; length of upper toothrow, 9.

Represented by 21 specimens, collected as follows: Mt. San Gabriel, 9, Feb. 18–20; Rancho Santuario, 6, Feb. 22–24 and March 6; La Cienega de las Vacas, 1, March 30; Rancho Bailon, 4, May 10; Arroyo de Bucy, 1, May 24.

Compared with a good series of topotypes of *N. intermedia albigula*, the skull of *N. i. durangæ* averages about 2 mm.

shorter and nearly 2 mm. wider, with very much heavier dentition (molars much broader), and a shorter and more strap-shaped interparietal. In coloration and external measurements the two forms are similar, but *durangæ* is less fulvous. It perhaps should be compared with *N. i. melanura* Merriam, from Ortiz, Sonora, from which, however, it appears to differ in having a larger head and body and much shorter tail, and by the absence (generally) of an antero-internal sulcus on m^1. No skull measurements were given of *melanura*, but the skull is described as smaller, with narrower nasals, than *albigula*, which is not the case with *durangæ*.

16. **Thomomys sinaloæ** *Merriam.*

Rio Sestin, 1 specimen, April 11.

17. **Thomomys,** sp.

Two specimens: Mt. San Gabriel, 1, Jan. 28; Matalotes, 1, March 20. They differ widely in coloration and probably represent two species, but the skull of one is too much broken for use in comparison.

18. **Perodipus obscurus,** sp. nov.

Type, No. 20957, ♂ ad., Rio Sestin, northwestern Durango, April 13; J. H. Batty.

General color of dorsal area gray brown slightly suffused with fulvous, resulting in a faintly olive gray brown effect; flanks more strongly suffused with fulvous, which is here the prevailing color; lower parts, including fore limbs, lower half of cheeks and sides of neck, clear white to base of hairs; tip of nose and a narrow line running back on each side of base of whiskers black; exterior surface of ears buffy whitish, nearly white apically and at base, antero-external border and inner surface blackish; small spot above eyes, postauricular patch, and oblique band on thighs white; outside of hind limbs to the tarsal joint like the back, inside white, soles dusky brown; tail with the sides and a basal ring white, the upper and lower surfaces blackish from base to tip, the upper surface heavily crested for about the terminal third.

Measurements. — Type, total length, 232; head and body, 102; tail vertebræ, 130; hind foot, without claws, 32, with claws, 35; ear from notch, 12.7. Skull with a broad rostrum, as in *P. agilis*, with

which species the skull closely agrees in general form; total length, 36; greatest mastoid breadth, 23; length of nasal, 13. As regards size, out of 40 adults only 4 exceed a total length of 240 (maximum, 250), and only 6 have a tail length of 136 or above (maximum, 140). Even the maximum size falls far below the minimum for adults of *P. agilis*.

Represented by 84 specimens, collected as follows; Rosario, 28, Jan. 24–27; Mt. San Gabriel, 2, Jan. 28; Rio del Bocas, 13, Feb. 8–9; Villa Ocampo, 5, Feb. 13; Rancho Santuario, 1, Feb. 22; Rio Sestin 35, April 9–17.

Twenty adults (12 males and 8 females), from Rio Sestin, measure as follows: 12 males, total length, 234 (223–244); head and body, 101.7 (98–111); tail vertebræ, 131 (121–136, only 2 below 130); hind foot (without claws), 32.4 (32–33); ear from notch, 13.2 (13–14): 8 females, 225.5 (218–238); 101.3 (98–105); 123.4 (120–133); 32.5 (32–33); 13.7 (13–14).

Nine males from Rosario: Total length, 229.6 (222–232, with 1 additional 250); head and body, 103 (95–114, with only 1 above 105); tail vertebræ, 126.7 (121–136, with only 1 above 130); hind foot, 34.6 (34–35); ear, 13.1 (13–14).

Eleven specimens (6 males and 5 females), from Rio del Bocas: 6 males, total length, 232.5 (223–245); head and body, 103.7 (102–105); tail vertebræ, 129 (121–140); hind foot, 34.5 (32–36); ear, 13.5 (13–14); 5 females, 230 (222–245); 103.2 (102–105); 127 (120–140, only 1 above 134); 33.8 (32–36); 13.5 (13–14).

Perodipus obscurus is the darkest-colored species of the genus thus far known, except possibly *O. agilis*, which has, however, a very different coloration, and is nearly double the size of the present species, which about equals *O. ordi* and *O. chapmani*. From all the smaller members of the group it differs too radically in coloration to require special comparison.

19. **Perognathus flavus** *Baird.*

Six specimens: Rancho Santuario, 1, Feb. 21; Rio Sestin, 5, April 16 and 17.

20. **Perognathus nelsoni** *Merriam.*

Ten specimens, as follows: San Gabriel, 2, Feb. 19 and 20; Rancho Santuario, 6, Feb. 22–March 8; Rio Sestin, 2, April 11.

Seven adult males measure: Total length, 178 (162–190); head and body, 82.4 (76–89); tail vertebræ, 99 (95–102);

hind foot (without claws), 19.8 (19–22); ear from notch, 8.5 (8–9.5).

These specimens are rather grayer and paler than August topotypes of *P. nelsoni*, but the difference is probably seasonal.

21. **Liomys canus** *Merriam.*

Ten specimens, collected as follows: Rosario, 6 young adults, Jan. 21–27; Rio Sestin, 4 adults, April 9–15. The January specimens are uniform dark gray above, with a pale yellowish lateral line; the April specimens are much paler gray, some of which have a distinct lateral line, while in others the line is obsolete. Two of the April specimens are beginning to moult, in one of which the pelage of a large part of the dorsal area has been renewed; the new pelage is much darker and mixed with fulvous, and closely resembles that of September topotypes of *L. canus* from Parral, Chihuahua, which locality is only about fourteen miles north of Rosario. These specimens are therefore almost topotypes of *L. canus*, but as a series they differ so widely from late September specimens of the latter that they might readily be mistaken for a different species. The difference, however, is obviously seasonal, and emphasizes the importance, in instituting comparisons between allied forms, of using material strictly comparable as to season. Rarely, perhaps, is such a wide range of seasonal variation met with as in the present species.

Three adult males measure, respectively, as follows: Total length, 244, 248, 252; head and body, 124, 130, 130; tail vertebræ, 114, 124, 122; hind foot (without claws), 31, 31.5, 31.5; ear (from notch), 17.5–18.3.

22. **Lepus (Macrotolagus) texianus micropus,** subsp. nov.

Type, No. 21251, ♂ ad., Rio del Bocas, northwestern Durango (altitude, 6800 feet), Feb. 12; J. H. Batty.

Similar to *L. texianus eremicus* Allen, and *L. texianus griseus* Mearns, but more brownish gray than the latter, and larger bodied,

with shorter tail, smaller hind feet, and larger ears than either, and with less fulvous along the sides of the body; prepectoral area paler and more grayish.

Measurements. — Type, total length, 535; head and body, 459; tail vertebræ, 76; hind foot, 114; ear from notch, 133; ear from crown, 175.

Represented by 19 specimens (8 males and 11 females), collected as follows: Rancho Santuario, 1, Feb. 2; Rio del Bocas, 5, Feb. 9–12; Rio Sestin, 1, April 18; Rancho Bailon, 12, May 5–13. As usual in the species of *Lepus*, the males are considerably smaller than the females, as shown by the following measurements, which include the whole Durango series:

Eight males: Total length, 564 (535–587); head and body, 493 (459–514); tail vertebræ, 71 (64–83); hind foot, 116 (108–127); ear (from notch), 136.4 (133–146).

Eleven females: Total length, 599 (559–626; only 1 below 578, and only 2 above 610); head and body, 524 (483–546); tail vertebræ, 73.7 (64–89); hind foot (without claws), 118 (108–124); ear (from notch) 137 (130–145; only 1 above 140).

This subspecies may be best compared with *L. texianus griseus* of Mearns, the type locality of which is Fort Hancock, El Paso County, Texas, inasmuch as I have a large series of this form from the southern border of New Mexico, taken near El Paso, collected and measured by Mr. Batty, and thus strictly comparable in measurements with his series of Durango specimens here under consideration. According to the same collector's measurements, 10 females of *griseus* have a head and body length of 460 as against 599 for 11 females of *micropus;* tail vertebræ 82 in *griseus* as against 74 in *micropus;* the hind foot 128 as against 118 in *micropus;* and the ear from notch 130 in *griseus* as against 137 in *micropus*.

Some of the May specimens are in worn pelage, but the coloration, in general effect, differs but little from that of the February specimens. The wearing away of the light tips to the hairs leaves the back darker, and the fulvous of the prepectoral area is duller and grayer, or less fulvous.

This form needs no comparison with *Lepus asellus* Miller, from San Luis Potosi, which belongs to the group with black at the base of the ears, of which there is no trace in the *texianus* group.

23. **Lepus (Microtolagus) gaillardi battyi,** subsp. nov.

Type, No. 21257, ♂ ad., Rancho Santuario, northwestern Durango, Mexico, Feb. 17, 1903; J. H. Batty.

Similar to *L. gaillardi* Mearns, but much smaller, the general coloration yellower and less rufescent, especially the underfur. Prepectoral collar much paler, nearly white or pale brownish white instead of buff; front of fore feet grayish white instead of buffy white, and upper surface of hind feet clearer or purer white. Extreme terminal portion (about 25 mm.) of anterior border of ear blackish in both forms.

Measurements. — Type, total length, 511; head and body, 451; tail vertebræ, 60; hind foot (without claws), 122; ear, from notch, 127, from crown, 140. Three adult males, same place and date, measure as follows: Total length, 501.5 (465–530); head and body, 451 (432–470); tail vertebræ, 61 (60–64); hind foot, 121 (119–124); ear from notch, 123 (115–133). The corresponding measurements of 3 specimens (1 male, 2 females) of *L. gaillardi*, as given in the original description are: Total length, 1 male, 530, 2 females (average), 567; tail vertebræ, 77, 86; hind foot (to end of claws), 131, 135; ear, from notch, 123, 127, from crown, 146, 148.

Skull. — Type, total length, 92; basal length, 82; zygomatic breadth, 44; greatest breadth across supraorbital processes, 31; postorbital constriction, 11; length of nasals, 40; anterior width of nasals, 11; posterior width of nasals, 20; palatal length (including point on anterior border of palatal floor), 9; length of premolar-molar series (at alveolar border), 17. Another skull measures practically the same in all dimensions, while a third (evidently younger) is 4 mm. shorter in total length, and proportionally smaller in all other dimensions except length of toothrow.

Three adult males, collected at Rancho Santuario, northwestern Durango, Feb. 17, 1903, have been compared with two of the original topotypes of *Lepus gaillardi*, collected on the boundary line of New Mexico and Chihuahua, and while essentially similar in general features, the Durango specimens are readily distinguishable by the coloration of the dorsal area, especially as respects the underfur, and also of the prepectoral band, and the anterior surface of the fore limbs and tarsi, these parts, as indicated above, being distinctly paler; the general size is also much less, as shown in the foregoing measurements.

This species is evidently rare in northern Durango, and was met with over a very limited area.

24. **Lepus (Sylvilagus) arizonæ major** *Mearns.*

Seventeen specimens, all but 4 adult, collected as follows: Matalotes, 1, March 20; Rancho Bailon, 16, May 5–12.

Five males measure: Total length, 355 (346–372); head and body, 312 (298–324); tail vertebræ, 43 (32–50); hind foot (without claws), 74 (70–76); ear from notch, 69.3 (69–70); 9 females, total length, 365 (344–388); head and body, 327 (308-343); tail vertebræ, 43.7 (38–50); hind foot (without claws), 74 (70–76); ear from notch, 68 (63.5–70).

According to the measurements taken from the fresh specimens by the collector, who collected and measured both series, the Durango specimens slightly exceed those from southern New Mexico (*L. a. minor*, from near El Paso, Texas) in all the measurements except that of the hind foot, which falls a little below that of the New Mexico series. The Durango specimens are very much paler, being less varied with black, and having the brownish tint of the ground color much paler. Owing to the larger size of the Durango specimens, they are referred to Mearns's subspecies *major*. The smaller size of the hind foot is paralleled in the *Lepus texianus* series from the same two regions. The measurements may be thus tabulated for comparison:

L. a. minor: 12 males, total length, 343; tail vertebræ, 40; hind foot, 77; ear, 65.4.

L. a. major: 5 males, total length, 355; tail vertebræ, 43; hind foot, 74, ear, 69.3.

L. a. minor: 10 females, total length, 347; tail vertebræ, 41; hind foot, 76; ear, 66.

L. a. major: 9 females, total length, 365; tail vertebræ, 43.7; hind foot, 74; ear, 68.

As the *minor* series was taken in December, and the *major* series in May, it is possible that the average may be affected by the fact that the December series may contain some 'young adults' which by the following May would have increased in size; but the improbability that this is the cause of the difference in average size is shown by comparison of the maxima of the two series, which differ correspondingly with the averages.

25. Lepus (Sylvilagus) durangæ, sp. nov.

Type, No. 21377, ♀ ad., Rancho Bailon (altitude, 7800 feet), northwestern Durango, May 12, 1903; J. H. Batty.

Size of *Lepus insolitus* Allen, from the Plains of Colima, State of Jalisco, but much less varied with black and the general coloration much paler, except the nape patch, the legs and feet, which are of the same deep rufous as in *L. insolitus*. In other respects the general coloration is not distinctly different from that of *L. arizonæ major* Mearns, collected at the same locality. From the latter it differs in being twice as large (in general bulk), and from both *L. insolitus* and *L. a. major* in important cranial characters.

Measurements. — Type, total length, 457 (as against 327 in *L. a. major*); head and body, 406; tail vertebræ, 51; hind foot (without claws), 95; ear (from notch), 76. The type and two paratypes measure as follows: Total length, 436 (419–457); head and body, 387.6 (356–406); tail vertebræ, 55 (51–63); hind foot, 93 (89–95); ear, 76 (73–79). Skull: Total length, 79 (as against 65 in *L. a. major*); basilar length, 60; zygomatic breadth, 36.3 (as against 32 in *L. a. major*); length of nasals, 35; width of nasals posteriorly, 16; anteriorly (= width of rostrum), 9; alveolar length of upper toothrow, 13.3; length of lower jaw, 55; height at condyle, 30; alveolar length of lower toothrow, 13.6. Skull similar in general contour to that of *L. a. major*, but very much larger, with actually smaller audital bullæ, which are hence proportionally at least one third smaller. Skull much less massive than that of *L. insolitus*, and so widely different in all details that no comparison is necessary.

Represented by three adult females, taken as follows: Rancho Bailon, 1 specimen, May 7; Arroyo de Bucy, 2 specimens, May 12 and 20.

This is a member of the *Sylvilagus* group, distinguished by large size and important cranial characters, especially the greatly reduced audital bullæ. It is recorded by the collector in his field notes as 'Mountain Rabbit,' the smaller *L. a. major*, found with it, being called 'Mesquit Rabbit.' It is about the size of *L. aztecus* Allen from Tehuantepec, which has a much broader rostrum, and still smaller bullæ, and is otherwise quite different in cranial details. It is also rather smaller and much darker in coloration. It is, perhaps, more closely allied to this species than to *L. insolitus*.

26. Canis impavidus, sp. nov.

Type, No. 21266, ♂ ad., Rio del Bocas (altitude, 7000 feet), northwestern Durango, Mexico, Feb. 13, 1903; J. H. Batty.

Similar in coloration to *C. cagottis* (Ham. Smith), but much larger, and the upper carnassial with a prominent protocone; in size and dental characters similar to *C. mearnsi*, but much paler, the throat and ventral region only slightly suffused with pale fulvous instead of buffy ochraceous, and fore and hind legs and feet not "bright orange fulvous all around," but fore legs posteriorly and hind legs and feet anteriorly pale fulvous, or pale yellowish white, as in *cagottis*.

Measurements. — Type, total length, 1143; head and body, 838; tail vertebræ, 305; hind foot (in dry skin), 178. Skull, total length, 190; basilar length of Hensel, 163; palatal length, 89; zygomatic breadth, 93; mastoid breadth, 59; length of crown of upper carnassial, 19.3.

The collector's external measurements of 7 adults are as follows: 3 males, total length, 1189 (1130, 1143, 1295); head and body, 855 (800, 838, 927); tail vertebræ, 334 (330, 305, 368); hind foot, 178 (given for one specimen only); ear from crown, 152 (1 specimen): 4 females, total length, 1123 (1105–1181); head and body, 806 (787–826); tail vertebræ, 341 (305–368); hind foot (not given); ear from crown, 138 (127–146).

Skull measurements of 4 males and 4 females: 4 males, total length, 195.6 (190–202); basilar length of Hensel, 170 (163–173); palatal length, 91.6 (89–93); zygomatic breadth, 93.5 (93–94; 2, the two largest being imperfect); mastoid breadth, 60.7 (59–62); length of crown of upper carnassial tooth, 19.7 (18.6–20.5): 4 females, total length, 190.5 (189–193); basilar length of Hensel, 166.3 (164.3–169); palatal length, 91.5 (90–94); zygomatic breadth, 95 (92–97); mastoid breadth, 59.4 (58–60.5); length of crown of upper carnassial, 18.3 (17.3–19.5). Six of the specimens are middle-aged adults; the other two (a male and female) are old adults with greatly worn teeth. In each case these two specimens are, respectively, the largest of the two series.[1]

The young specimens (so young that the eyelids remain tightly closed in the skins, even after the process of skinning) have the front of the head as far back as the eyes, including sides of nose and chin, blackish brown; the rest of the head and body dark buffy brown, nearly black along the median line of the back, lighter on the sides of the body and beneath, with a large white pectoral area, varying in size, shape, and in the purity of the white in different individuals; limbs and tail blackish, like the nose.

[1] The old male skull is especially interesting pathologically, on account of an accident, received apparently in early life, to the right side of the skull, resulting in a fracture of the zygomatic arch and serious injury to the right ramus. The broken parts of the arch became displaced and failed to unite, resulting in their partial atrophy and a marked asymmetry of the skull, including an axial curvature to the left. The axis of the right ramus is also curved inward instead of outward, and, with the loss of the last two premolars, has undergone more or less atrophy. Yet the specimen, in both external and cranial measurements, is the largest of the series. Externally the head shows no sign of injury.

Represented by 8 adults (7 skins and an additional skull) and 7 newly born young, collected as follows: Villa Ocampo, 2 males, Feb. 13; La Boquilla, 1 female, Feb. 14; Rio Sestin, 1 male and 2 females, April 16–19; Rancho Bailon, 1 female and 7 young (a few days old), May 8 and 14. The February specimens are in good pelage; the April and May ones are somewhat worn and faded.

It is with much hesitation that I add a new name in a group so imperfectly known as the Coyotes, but the present series of specimens from northwestern Durango are clearly not the *C. cagottis* of eastern Mexico, nor are they referable to *C. mearnsi* from southern Arizona. In some respects they combine the characters of both, but not in an intermediate sense.

In the valley of the Rio Sestin, says Mr. Batty in his notes, "the coyotes greatly annoy the ranchmen in the winter months. They are very bold, often entering corrals in the daytime, killing calves, sheep, and goats. I have known them to take small pigs from the steps of the squatters' huts." He also refers to a night attack on his camp by a pack of about twenty coyotes, who dragged away five deer skins from within twenty feet of where he was lying. Three paid the penalty with their lives and form part of the specimens above enumerated.

27. **Mephitis macroura milleri** *Mearns.*

Two specimens, females, collected, respectively, at Rio Sestin, April 17 (with *M. estor*), and at Rancho Bailon, May 4.

28. **Mephitis estor** *Merriam.*

Three specimens, 2 males and 1 female, collected as follows: La Cienega de las Vacas, 1 male, April 1; Rio Sestin, 2 (male and female), April 17.

29. **Procyon lotor hernandezii** (*Wagler*).

A single skull, "found on the prairie," at Rancho Santuario.

30. **Myotis incautus** (*J. A. Allen*).

Sixteen specimens: Rio Sestin, 2 (skins), April 16; San Gabriel, 14 (in formalin), June 16.

31. **Myotis californicus durangæ,** subsp. nov.

Type, No. 21459, ♀ ad., Rio Sestin, northwestern Durango, April 15; J. H. Batty.

Like *M. c. ciliolabrum* except in color. Upper parts pale fawn brown (between drab and ecru drab of Ridgway); under parts grayish white; fur at base everywhere dark plumbeous; ear brownish black, much paler than in *ciliolabrum;* muzzle blackish.

Measurements. — Type, total length, 76; tail vertebræ, 33; forearm, 33; longest finger, 54; tibia, 15; foot, 7; ears from meatus, 13.5. Five other specimens, collected at the same time and locality, vary but slightly from the above, the extremes varying only 4 mm. in total engths and 2 mm. in the length of the forearm.

Represented by 6 skins and skulls taken at Rio Sestin, April 15, and 6 in formalin collected at San Gabriel, June 16.

This subspecies presents a very distinct type of coloration in the *Myotis californicus* group, intermediate between that of *M. c. mexicanus* and *M. c. ciliolabrum*, but very different from either. It agrees in size very closely with *ciliolabrum*.

32. **Vespertilio fuscus** (*Beauvois*).

Two specimens, Arroyo de Bucy, May 22 and 24. Expanse, 318 and 320. Not appreciably different from Arizona specimens.

33. **Antrozous pallidus** (*Leconte*).

One specimen, adult male, Rio Sestin, April 13. Expanse, 362; total length, 102. Paler, and whiter below than Arizona and Texas specimens.

34. **Nyctinomus mohavensis** *Merriam.*

Three specimens, Rio Sestin, April 13 and 16. Provisionally referred to *mohavensis.*

LIBRARY OF THE UNIVERSITY OF CALIFORNIA

Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. December, 1901. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. 1–28. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume	I, 1881–86.....	Price,	$5.00
"	II, 1887–90.....	"	4.75
"	III, 1890–91.....	"	4.00
"	IV, 1892	"	4.00
"	V, 1893	"	4.00
"	VI, 1894	"	4.00
"	VII, 1895	"	4.00
"	VIII, 1896.....	"	4.00
"	IX, 1897.....	"	4.75
"	X, 1898.....	"	4.75
Volume	XI, Part I, 1898,	Price,	1.25
"	" " II, 1899	"	2.00
"	" " III, 1900	"	2.00
"	" " IV, 1901	"	1.75
"	" (Complete).	"	5.00
"	XII, 1899.....	"	4.00
"	XIII, 1900.....	"	4.00
"	XIV, 1900.....	"	4.00
"	XV, Part I, 1901	"	3.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILIÈRLE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

(*Continued on 3d page of cover.*)

A New Deer and a New Lynx from the State of Sinaloa, Mexico.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XIX, Article XXV, pp. 613–615.

New York, Nov. 14, 1903.

The Knickerbocker Press, New York

Article XXV. — A NEW DEER AND A NEW LYNX FROM THE STATE OF SINALOA, MEXICO.

By J. A. Allen.

A few years since, the Museum purchased a few mammals from Mr. J. H. Batty, collected by him at Escuinapa, southern Sinaloa, in December, 1895. Among the species represented are *Lepus insolitus* Allen, *Canis vigilis* Merriam, and the Lynx and Deer here described. Both are well-marked forms that appear to have hitherto escaped notice.

Odocoileus sinaloæ, sp. nov.

Type, No. 14334, ♂ 2d year, Escuinapa, southern Sinaloa, Mexico, Dec. 15; J. H. Batty.

General color above yellowish gray brown, the top of the head only a little darker than the back; no dark median dorsal band, but middle region of the back darker than the flanks; the hairs individually are light ashy brown for the basal two-thirds, then pass into blackish and are subapically ringed with deep buff and minutely tipped with black; axillary and inguinal regions, posterior face of upper part of fore legs, and inside of thighs white; a broad black band above nose pad, not reaching the lips; no black band or spots on the chin; sides of nose, a broad space behind nose band, and a broad, poorly defined eyering gray; chin and throat buffy grayish white; ears heavily clothed externally and colored like the back, with a very narrow blackish edging on the anterior border; inside of ears thinly clothed with whitish hairs, forming a fringe on the anterior border; tail long, bright rufous above, white below; limbs buffy brown anteriorly, yellowish white on the sides and posteriorly below the carpal and tarsal joints.

Measurements.—Approximate from flat skin: total length, 1435 mm.; tail vertebræ, 175; hind foot, 340; ear from anterior base, 145; ear from notch, 117.

Skull. — Nasals short and narrow; lachrymal pit rather deep and imperforate; antorbital vacuities exceedingly large, nearly twice as large as in *O. toltecus* of corresponding age and size; premaxillaries terminating about 12–15 mm. from nasals; audital bullæ large, the two diameters nearly equal. Total length (male, 2d year), 215; basal length of Hensel, 200; occipitonasal length, 182; length of nasals, 56; zygomatic breadth, 91; width of frontals at anterior border of orbit, 54.5; width of constriction at base of horns, 69; mastoid breadth, 65; alveolar length of upper premolar-molar series, 70. The antlers are slender spikes, 45 mm. long in one specimen and 88 mm. in the other.

This species is based on the skins and skulls of two young males (probably in the second year — the last molar just cutting the gum), collected at Escuinapa, southern Sinaloa, Dec. 11, and hence in full winter coat. In size they resemble specimens of *O. toltecus* of corresponding sex and age, but differ widely from them in coloration and cranial characters. *O. acapulcensis*, its nearest geographical ally on the Pacific Coast of Mexico, is much smaller and very different in coloration and other characters.

Lynx ruffus escuinapæ, subsp. nov.

Type, No. 14326, ♂ ad., Escuinapa, Sinaloa, Mexico, Dec. 24, 1895; J. H. Batty.

General color above pale rufous varied with gray, darker on the back and lighter on the sides, the middle of the dorsal region sharply striped and spotted with black, the sides, from shoulders to hips, with larger spots of duller brownish black; along the median line of back a nearly continuous band of black, made up of two parallel, narrow, more or less interrupted lines of black; nape and top of shoulders more strongly rufous and less gray than the rest of the dorsal surface; top of head prominently streaked and spotted with black; front and sides of head gray, mixed with pale rufous, with a narrow black eyering nearly encircled by a broad outer somewhat imperfect ring of grayish white; middle lateral portion of upper lip strongly marked with black; sides of neck below the ear broadly striped with black; back of ears black, with a triangular patch of whitish gray extending inward from the outer margin and along the edge to the outer base; inside of ears pale buffy gray; fore limbs externally pale rufous, prominently blotched with black, the spots becoming smaller distally and the general color paler; inner side whitish, with broad half-rings and spots of black; hind limbs similar, but the black spots much larger on the proximal portion; middle of soles of hind feet darker than the edges, but not forming a broad central blackish stripe as in most of the other members of the group; ventral surface white, with a broad prepectoral pale rufous band, and a slight buffy suffusion over the middle portion of the abdomen; the whole ventral area, but especially the pectoral region, heavily blotched with black; upper surface of tail like back, with a broad apical half-ring of black, preceded by a narrow transverse spot of black, and with proximally several paler half-rings of blackish brown; middle of tail below white, which also shows as a slight white tip. Although killed in midwinter (Dec. 24), the pelage is very short and coarse in comparison with the more northern forms of the group, and is immensely different from the long, soft, silky coat of *L. baileyi*.

Measurements (from a well-made skin, the flesh measurements not being at present available).—Total length, 805 mm.; tail vertebræ, 117; hind foot, 160; ear from notch (probably shrunken), 55. Skull, total length, 115; basilar length of Hensel, 94; palatal length, 41; nasals (imperfect); zygomatic breadth, 78; interorbital breadth, 22; breadth across postorbital processes, 52; mastoid breadth, 52.3; breadth between outer corners of upper carnassials, 45.5; length of upper carnassial, 14.6.

Lynx r. escuinapæ is distinguished from winter specimens of *L. r. californicus* and *L. r. texensis* by smaller size, shorter and coarser pelage, more rufous and less gray coloration, the greater abundance of black spots and streaks on the back, and the absence of the black soles.

Continued from 4th page of cover.)

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. December, 1901. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. 1–28. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.'

Volume I, 1881–86.....	Price, $5.00	Volume XI, Part I, 1898,	Price, 1.25
" II, 1887–90.....	" 4.75	" " " II, 1899	" 2.00
" III, 1890–91.....	" 4.00	" " " III, 1900	" 2.00
" IV, 1892	" 4.00	" " " IV, 1901	" 1.75
" V, 1893	" 4.00	" " (Complete).	" 5.00
" VI, 1894	" 4.00	" XII, 1899.....	" 4.00
" VII, 1895	" 4.00	" XIII, 1900.....	" 4.00
" VIII, 1896.....	" 4.00	" XIV, 1900.....	" 4.00
" IX, 1897.....	" 4.75	" XV, Part I, 1901	" 3.00
" X, 1898.....	" 4.75		

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued in numbers. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRLE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of about 400 pages, and about 25 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I (not yet completed).

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

(*Continued on 3d page of cover.*)

New Forms of the Mountain Goat (Oreamnos).

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XX, Article II, pp. 19–21.

New York, February 10, 1904.

The Knickerbocker Press, New York

Article II. — NEW FORMS OF THE MOUNTAIN GOAT (OREAMNOS).

By J. A. Allen.

The type locality of *Oreamnos montanus* (Ord) is given by Miller and Rehn (Proc. Boston Soc. Nat. Hist., XXX, No. 1, Dec. 1901, p. 23) as the "Cascade Range, near the Columbia River, in Oregon and Washington." A comparison of specimens of *Oreamnos* from the Cascades of northern Washington with others from Montana and northern British Columbia shows that the species commonly recognized as *O. montanus* is separable into three geographical forms, namely, (1) *O. montanus montanus* from the Cascades, (2) a much larger form, with longer and narrower skull, from British Columbia, and (3) a much smaller form, with the same type of skull as the last, from Montana and Idaho. As the pelage in all the forms is white, the distinctive characters must rest on size and the form of the skull, so far as present material is available. These forms may be distinguished as follows:

Size medium, skull broad.....*O. montanus montanus* (Ord).
Size large, skull narrow.....*O. montanus columbianus*, subsp. nov.
Size small, skull narrow.....*O. montanus missoulæ*, subsp. nov.

The material available for the present comparison consists of 19 specimens, of which 3 are from the Cascades of northern Washington, 7 from British Columbia (4 from the Shesley Mountains, northern British Columbia, and 3 from near Golden, southern British Columbia), 8 from Montana (mainly from Missoula County), and 1 from Idaho. They include adult males of each of the three forms, and adult females and young males of two of them.

Oreamnos montanus montanus (*Ord*).

Old male skull (No. 14890, Cascade Mountains, northern Washington, Prof. L. L. Dyche), occipito-nasal length, 312; basal length of Hensel, 270; zygomatic breadth, 114; interorbital breadth, 95; width of maxillary region above m^2, 86.5; nasals, 104 x 34; length of palate,

176; upper toothrow (on alveolar line), 73; ratio of interorbital breadth to basal length, 41. Hoof of outer digit of fore foot (at edge of hair), 66 x 30; do. hind foot, 57 x 28.

An adult female skull measures, occipito-nasal length, 291; basal length, — (skull imperfect); zygomatic breadth, 105; interorbital breadth, 87; width of maxillary region above m^2, 80; nasals, 85 x 32; length of palate, 169; upper toothrow, 76.5

The collector's external measurements, in part, are as follows: Femur to humerus, 33½ in. (851 mm.); height at shoulders, 39¼ in. (997 mm.).

Oreamnos montanus columbianus, subsp. nov.

Type, No. 19838, ♂ ad., Shesley Mountains, northern British Columbia; Andrew J. Stone.

Old male skull (type), occipito-nasal length, 336; basal length of Hensel, 293; zygomatic breadth, 119; interorbital breadth, 98; width of maxillary region above m^2, 87; nasals, 122 x 38; length of palate, 184; upper toothrow, 77; ratio of interorbital breadth to basal length, 35. Hoof of outer digit of fore foot, 74 x 35; do. hind foot, 66 x 33.

The collector's external measurements are, in part, as follows: Femur to humerus, 36 in. (914 mm.); height at shoulder, 43 in. (1088 mm.).

Two other males, adult but not so old, are slightly smaller, having an occipito-nasal length, respectively, of 332 and 299. Three skulls from the Selkirk Mountains (near Golden), southern British Columbia, collected and presented by Messrs. Madison Grant and C. A. Moore, Jr., agree almost exactly in measurements and proportions with the two largest skulls from the Shesley Mountains in northern British Columbia.

Oreamnos montanus missoulæ, subsp. nov.

Type, No. 19336, ♂ ad., Missoula, Montana; E. S. Hathaway.

Old male skull (type), occipito-nasal length, 299; basal length of Hensel, — (basioccipital region mutilated); zygomatic breadth, 108; interorbital breadth, 87; width of maxillary region above m^2, 81; nasals, 104 x 33; length of palate, —; upper toothrow, 69; ratio of interorbital breadth to basal length, —. Hoof of outer digit of fore foot, 56 x 28; do. hind foot, 52 x 26.

There are no collector's external measurements available.

Another Montana specimen (skull), not quite so old, but a mature adult, is slightly smaller. An old female skull measures, occipito-nasal length, 280; basal length, — (basioccipital region imperfect); zygomatic breadth, —; interorbital breadth, 80; width of maxillary

region above m^2, 73; nasals, 96 x 27; length of palate, (imperfect); upper toothrow, 74.

The difference in size between the Montana and British Columbia specimens is striking; the Cascade specimens are intermediate in size between these two forms, but differ from either in the markedly greater relative breadth of the skull.

(*Continued from 4th page of cover.*)

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. Pp. 77–132. January, 1902. Price, $1.00.

PART IV.—Shell Heaps of the Lower Frazer River. By Harlan I. Smith. Pp. 133–190, pll. vi, vii, and 59 text figures. December, 1902. Price, $1.00.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 1–270. January, 1902. Price, $3.00.

PART II.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 271–402. December, 1902. Price, $1.50.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. Pp. i–xvi, 1–332, pll. i–viii (5 colored), and 19 text figures. May, 1902. Price, $5.00.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. January, 1902. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. i–xxviii. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.

Volume I, 1881–86.....	Price, $5.00	Volume XI, Part III, 1900,	Price, $2.00
" II, 1887–90.....	" 4.75	" " " IV, 1901	" 1.75
" III, 1890–91.....	" 4.00	" " (Complete)...	" 5.00
" IV, 1892.....	" 4.00	" XII, 1899.....	" 4.00
" V, 1893.....	" 4.00	" XIII, 1900.....	" 4.00
" VI, 1894.....	" 4.00	" XIV, 1900.....	" 4.00
" VII, 1895.....	" 4.00	" XV, Part I, 1901..	" 3.00
" VIII, 1896.....	" 4.00	" XVI, 1902.....	" 5.00
" IX, 1897.....	" 4.75	"XVII, Part I, 1902..	" 1.50
" X, 1898.....	" 4.75	" " " II, "	" .75
" XI, Part I, 1898	" 1.25	"XVIII, " I, "	" 2.00
" " " II, 1899	" 2.00	" XIX, 1903.....	" 6.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued quarterly. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of from about 400 to 700 pages, and from about 25 to 60 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I.

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the Report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

PART VIII.—The Reptilian Subclasses Diapsida and Synapsida and the Early History of the Diaptosauria. By Henry Fairfield Osborn. Pp. 449–507, pl. xl, and 28 text figures. (With Contents and Index to Volume I.) November, 1903. Price, 2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

PART II.—The Basketry of the Tlingit. Pp. 229–277, pll. v–xviii, and 73 text figures. July, 1903. Price, $2.00.

(*Continued on 3d page of cover.*)

Mammals from Southern Mexico and Central and South America.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XX, Article IV, pp. 29–80.

New York, February 29, 1904.

The Knickerbocker Press, New York

Article IV. — MAMMALS FROM SOUTHERN MEXICO AND CENTRAL AND SOUTH AMERICA.

By J. A. Allen.

During the last three years the Museum has obtained by purchase several small collections of mammals from Mexico and Central America, the more important of which are the three which form the subject of the present paper. In working up these collections much other material previously in the Museum, including considerable from Colombia and Venezuela, has been critically examined, with the result that a number of apparently new forms have been discovered, and are here included.

In this connection I wish especially to acknowledge my indebtedness to Mr. Outram Bangs, Curator of Mammals at the Museum of Comparative Zoölogy, Cambridge, Mass., for the generous loan of types, topotypes, and other material from Chiriqui and elsewhere; to Mr. Gerrit S. Miller, Jr., in charge of the collection of mammals at the U. S. National Museum, for the use of specimens from Mexico and Costa Rica; and to Dr. C. Hart Merriam, Chief of the Biological Survey, U. S. Department of Agriculture, for the loan of specimens, and for aid in determining some of the smaller rodents in the Vera Cruz collection.

I. — Southern Vera Cruz, Mexico.

A collection of about 150 specimens of mammals was made for the Museum by Mr. E. A. Colburn, in the State of Vera Cruz, during March and April, 1901. The collection, however, contained no bats. The locality given for the specimens is "Pasa Nueva," situated a short distance from Tlacotalpan, about 60 miles south of the city of Vera Cruz, in the low tropical coast belt.

1. **Marmosa murina mexicana** *Merriam.* Two specimens, male and female, March 11.

2. **Metachirus fuscogriseus pallidus** *Allen.* One specimen, adult male, April 6. Total length, 581; tail vertebræ, 301; hind foot, 40.

3. **Didelphis mesamericana tabascensis** *Allen.* Two specimens, male and female, March 3 and 11.

4. **Tamandua tetradactyla** (*Linn.*). Six specimens — 1 young male, 5 adult females — March 16–19, April 2–12.

5. **Tayassu angulatum humerale** *Merriam.* Three specimens, March 15 and April 5 and 15.

6. **Odocoileus toltecus** (*Saussure*). Four specimens, 3 males (2 young) and 1 female, March 14 and April 10 and 12.

7. **Sciurus aureogaster hypopyrrhus** (*Wagler*). Eighteen specimens, March and April. Four are in the usual red phase, 8 are uniform intense black, and 5 are intermediate, but approach the black phase more than the red phase, most of them having merely a little red on the ventral surface, the rest of the pelage being intense black.

8. **Peromyscus affinis** (*Allen*). Twenty-two specimens, March 10–April 12.

Young adults are darker than old adults, with the median dorsal area blackish. About half the specimens have a small area of chestnut on the breast, varying in size and distinctness from a mere trace to a well-defined and strongly colored patch, the rest being without even a trace of this marking. Adults range in total length from 170 to 190, averaging about 180; tail vertebræ, 70 to 81, averaging 75; hind foot, 20 to 20.4, averaging 20.2.

9. **Peromyscus mexicanus** (*Saussure*). Eight specimens, March 10–13, and April 6; 4 old adults, 3 young adults, and 1 two thirds-grown young. The adults range in total length from 220 to 240 (av. 230); in length of tail vertebræ from 110 to 120 (av. 114); hind foot, av. 20.5.

10. **Oryzomys rostratus** *Merriam.* Six specimens, 4 of which are adult, March 11–17 and April 4. Length of adults

221–240 (av. 233); tail vertebræ, 110–121 (av. 118); hind foot, 20.7.

11. **Oryzomys jalapæ rufinus** *Merriam.* One adult male, April 9. Total length, 260; tail, 140.5; hind foot, 20.9.

12. **Sigmodon toltecus** (*Saussure*). Four specimens, April 5–13.

13. **Liomys pictus rostratus** *Merriam.* Twelve specimens, March and April. Five adult males: Total length, 257 (250–260); tail vertebræ, 130 (123–140); hind foot, 29.6 (29–30).

14. **Lepus (Sylvilagus) russatus,** sp. nov.

FIGURES 1, 4, AND 7.

Type, No. 17203, ♂ ad., Pasa Nueva, Vera Cruz, Mexico, April 10, 1901; A. E. Colburn.

Pelage coarse and harsh. General coloration above, including upper surface of head, whole dorsal region, and upper surface of tail, pale brownish russet, varied with dark brown; sides and hips varied with creamy white; nape patch, anterior surface of fore limbs, and outer surface of hind limbs, ferrugineous; cheeks and sides of neck like back but strongly varied with black; ventral surface yellowish white, the darker color of the sides encroaching on the sides of the abdomen; prepectoral band clay color; upper surface of hind feet creamy white; ears externally grayish brown, slightly tinged with pale rusty, and gradually darkening on the apical third to blackish.

Measurements. — Total length, 450; tail vertebræ, 42; hind foot, 80; ear from crown (in dry skin), 62. Skull, occipito-nasal length, 78.5; basal length (inner base of incisors to posterior border of occipital condyles), 63; greatest zygomatic breadth, 35.2; interorbital breadth, 17; mastoid breadth, 28; width of braincase, 25; length of nasals, 36; width at posterior border, 17; length of palatal bridge, 7.5 (10 to tip of frontal spine); length of malar, 33.5; upper toothrow (crown surface), 6.5; palatal foramina, 19, by 7 at posterior border; length of lower jaw (front base of incisors to angle), 55; height at condyle, 35.

The skull is narrow for its length; the occipital portion only moderately depressed, audital bullæ very large for the size of the skull, nearly twice as large as in skulls of *Lepus aztecus* of practically the same size.

Lepus russatus is distinguished from its nearest geographical allies, *L. aztecus* (Figs. 2, 5, 8) and *veræ-crucis*, by the russet

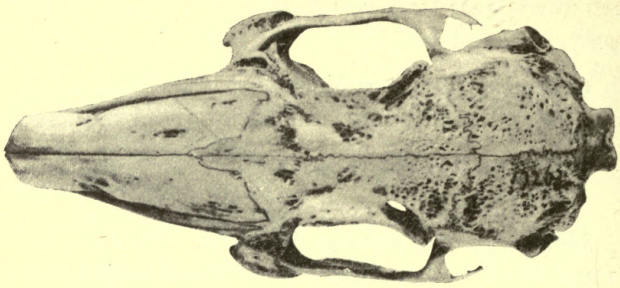


Fig. 1. *Lepus russatus.* No. 17203. ♂ ad. Type. Nat. size.

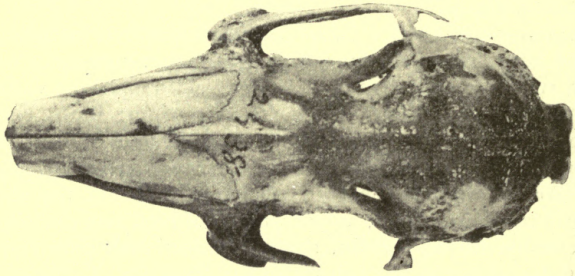


Fig. 2. *Lepus aztecus.* No. $\frac{3116}{2458}$. ♂ ad., Tehuantepec, Mexico. Type. Nat. size.

Fig. 3. *Lepus parvulus.* No. $\frac{18578}{16458}$, adult. Type. Nat. size.

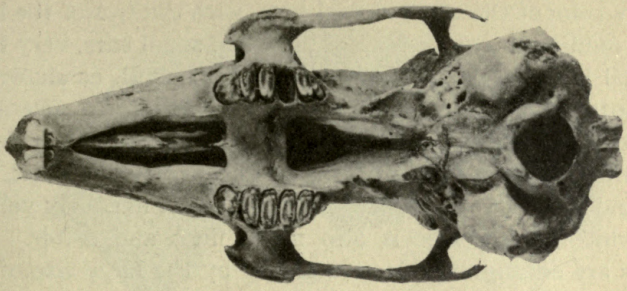


Fig. 4. *Lepus russatus.* From same skull as Fig. 1. Nat. size.

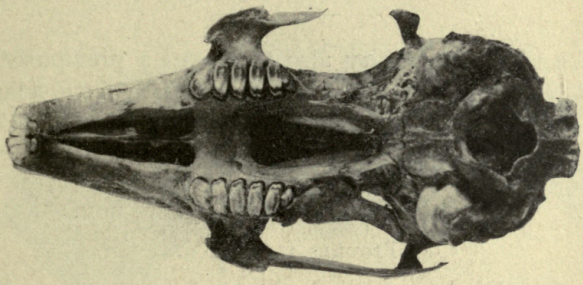


Fig. 5. *Lepus aztecus.* Same skull as Fig. 2. Nat. size.

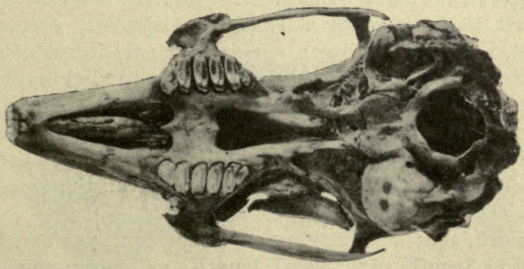


Fig. 6. *Lepus parvulus.* Same skull as Fig. 3. Nat. size.

brown color of the whole dorsal area, with the tips of the hairs dark reddish brown instead of blackish, small ears, very large audital bullæ, and the narrowness of the skull, as shown by the interorbital measurement. In coloration *L. aztecus* is not so dark brown on the middle dorsal region, and the cheeks and sides of the body are gray instead of like the back, and the under surface is broadly white instead of narrowly yellowish white; the pelage is also much finer and softer. The skulls are distinguishable at a glance by the large size of the bullæ in *L. russatus*, the much narrower basioccipital, and by other less obvious differences. Although represented by a single specimen (fortunately in excellent pelage), the differences which distinguish it from the nearest known allied species are too strongly marked to be easily overlooked.

I take this opportunity also to record a previously undescribed very small *Sylvilagus* from the arid tablelands of southern Hidalgo, collected at Apam, by Mr. Frank M. Chapman in March, 1897.

Lepus (Sylvilagus) parvulus, sp. nov.

FIGURES 3, 6, AND 9.

Type, No. $\frac{12578}{10888}$, Apam (altitude about 8000 feet), southern Hidalgo, Mexico, March 19, 1897; Frank M. Chapman.

General color above pale buff, strongly varied with black, the hairs being subapically buff, with conspicuously long black tips, the prevailing color over the posterior half of the dorsal surface being blackish, indistinctly lighter and slightly grayish on the rump; chin, throat, and middle ventral surface yellowish white, the color of the sides extending well down upon the sides of the abdomen; prepectoral area very broad, pale rusty brown; nape patch pale ferrugineous; upper surface of fore feet pale rusty, of the hind feet still lighter or deep buff; eyering deep buff; sides of head buffy brown, varied with black-tipped hairs; ears externally buffy gray brown, darker, almost black on the outer edge and at the tip; ears internally pale yellowish brown with a deep buffy edging; upper surface of tail blackish, the extreme tips of the hairs buffy gray.

Total length, 390; tail vertebræ, —; hind foot, 75; ear, 65. Skull, occipito-nasal length, 65; basal length, 54.5; greatest zygomatic breadth, 33; interorbital breadth, 18.4; mastoid breadth, 27; width

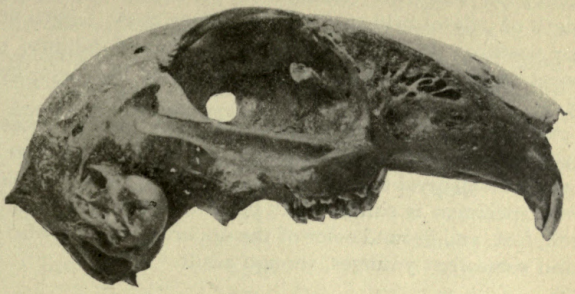


Fig. 7. *Lepus russatus.* Same skull as Fig. 1. Nat. size.

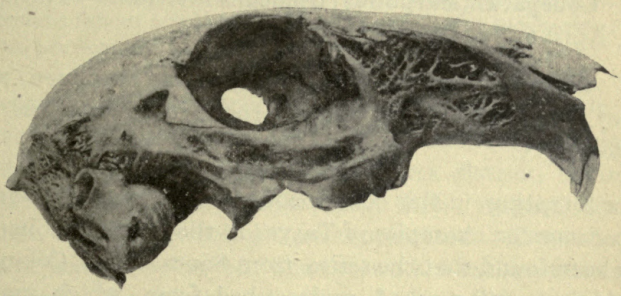


Fig. 8. *Lepus aztecus.* Same skull as Fig. 2. Nat. size.

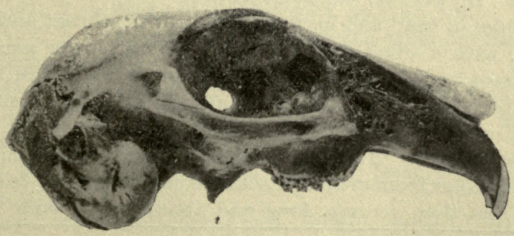


Fig. 9. *Lepus parvulus.* Same skull as Fig. 3. Nat. size.

of braincase, 25; length of nasals, 25; width of nasals, posteriorly, 13.5; length of palatal bridge, 5.2 (with spines, 8.5); length of malar, 28; upper toothrow (crown surface), 10; palatal foramina, 14.5, by 5.2 at point of greatest width; length of lower jaw, 43; height at angle, 25.5.

Skull rather broad, upper contour strongly arched posteriorly; bullæ very large for the size of the skull, much larger than in *L. aztecus*, although the general size of the skull is nearly one half less.

A second specimen is similar, but paler throughout, including the nape patch, feet, and ground color of the upper parts; it is also slightly smaller and somewhat younger, though adult.

In general size *L. parvulus* is similar to *L. bachmani* and *L. cinerascens*, but it differs too widely from them in cranial characters to need further comparison. In skull structure it seems to be a diminutive member of the *Sylvilagus* group, from all other forms of which its small size will distinguish it.

15. **Conepatus (Marputius) tropicalis** *Merriam.* Two specimens, April 6.

16. **Tayra barbara senex** (*Thomas*). One specimen, adult female, March 18. Total length, 1000; tail vertebræ, 375; hind foot, 115.

In attempting, in this connection, to determine the various South American examples of Tayras in the Museum collection it has been found that the series from Santa Marta, Colombia, represents a well-marked, undescribed form, which may be characterized as follows:

Tayra barbara irara,[1] subsp. nov.

Type, No. 15469, ♂ ad., Bonda, Santa Marta District, Colombia, June 6, 1899; Herbert H. Smith Collection.

Top and sides of head and neck grayish brown; throat and foreneck dark brown, with a small pale yellowish spot on lower neck; whole body and limbs very dark brown, darker or nearly black along the middle of the back, forming an indistinct dorsal band, continued on the tail; tail rather darker than the body, brownish black, becoming nearly black apically. The yellow throat patch varies, in different individuals, in color from cream to ochraceous, and in size from a small oblong spot less than 20 mm. long and about 6 mm. wide to a large

[1] *Irara*, the native local name.

triangular area 50 mm. wide and 75 mm. long, the apex pointing backward; but the outline is often more or less irregular.

Measurements. — Type, total length, 1016; tail, 381; hind foot, 114. In 8 adult specimens, all from the vicinity of Bonda, the external measurements are as follows:

14860, ♂,	Total length,	1133;	tail vertebræ,	356;	hind foot,	102.
14630, ♂,	"	"	1080;	"	"	449;	"	"	92.
15472, ♂,	"	"	1044;	"	"	—;	"	"	—.
15471, ♂,	"	"	1016;	"	"	446;	"	"	89.
14629, ♂ juv.	"	"	991;	"	"	394;	"	"	102.
14861, ♀,	"	"	953;	"	"	381;	"	"	—.
15469, ♀,	"	"	1016;	"	"	381;	"	"	104.
14631, ♀?,	"	"	750;	"	"	330;	"	"	89.

The skull of the type measures: Occipito-nasal length, 111; basal length, 106.5; zygomatic breadth, 59; width of braincase, 47; postorbital constriction, 21.5; interorbital breadth, 25.5; upper toothrow, — (imperfect). Another old male skull, with practically the same dimensions (about a millimeter less), has the upper toothrow 22. The females are somewhat smaller.

Represented by 10 specimens, 8 of which are adult and 2 rather young, all collected at or in the immediate vicinity of Bonda (altitude 250 feet), Santa Marta district, during the months of February, March, April, June, August, and November, all seasons being thus represented. They vary but little in general color, but one or two are rather darker than the others. Singularly enough, 7 of the 10 specimens have a whitish patch on the 'withers,' but it varies greatly in size, from a mere trace to a large spot, as follows:

No. 14861, ♀, an oval spot on the left side of the median line, 20 mm. long by 5 mm. wide.

No. 14629, ♂, a diamond-shaped spot, 40 x 40 mm.

No. 15471, ♂, a triangular spot, with the apex directed backward, 46 mm. across the front, and 45 in length.

No. 14630, ♂?, a triangular spot, as in the last, 40 x 45 mm.

No. 14860, ♂?, a subtriangular spot, with the right anterior angle lengthened, 38 x 49 mm.

No. 14631, ♀?, a patch of very irregular form, 50 mm. wide by 75 mm. long.

No. 15470, ♂, a crescentic patch, opening forward, 95 mm. across from point to point, and 125 mm. long, measured from a transverse line

across the points of the crescent to the point of greatest convexity, the greatest width of the light band being 55 mm.

This feature is of interest in connection with Mr. Thomas's remarks (Ann. and Mag. Nat. Hist. (7), V, Jan., 1900, pp. 147, 148) in reference to three specimens from widely separated localities showing this "spasmodic variation," found by him in the British Museum collection. In the present subspecies it amounts to almost as constant a character as the gular patch. It is not present, however, in a single specimen in an equal number of examples in this Museum from other localities.

Tayra barbara irara differs from typical *barbara*, from Venezuela and Brazil, in being very much smaller, apparently scarcely exceeding *Tayra barbara trinitatis* (Thomas) from the island of Trinidad, and dark chocolate brown instead of deep black. Two old males from Suapure, Venezuela, and other examples from Brazil, are intensely black throughout, except for the head and neck, and greatly exceed the Santa Marta specimens in size, the occipito-nasal length of the skull ranging from 118 to 126 mm., the basal length from 115 to 118, the zygomatic breadth from 70 to 79, and the upper toothrow from 24 to 26, against, respectively, 111, 106.9, 69, and 21.5 in *irara*.

Various names have been applied to the South American Tayras, but, as Mr. Thomas has noted (Ann. and Mag. Nat. Hist. (7), VII, Feb., 1901, p. 180), most of them are strict synonyms of *Mustela barbara* Linn. (1758), from "Brasilia." Apparently Linnæus described the animal from a specimen. He cites 'Ac. Holmens.', and Brown's 'History of Jamaica,' the last with a query. The former I am unable to consult. Brown's "Galera . . . The Guinea Fox," is based on an animal "often brought to Jamaica from the coasts of Guinea, where it is a native." In the 12th edition of the 'Syst. Nat.' only Brown is cited. As "Brasilia" is probably used in a general sense, it seems proper to consider the type region of *Tayra barbara* as Guiana. *Mustela gulina* Schinz (1821), and *Gulo canescens* Lichtenstein (1823, ex Illiger MS.) are merely new names for *Mustela barbara* Linn.; *Vivera* [*sic*] *poliocephalus*

[*sic*] Traill (1821) was based on a specimen "brought to England from Demerara," and is therefore also a synonym of *M. barbara* Linn.; the *Mustela barbara* var. *laira* F. Cuvier was also from Guiana. *Eira ilya* H. Smith (Nat. Libr., XV, 1842, 203) was based on a crude drawing, by Prince John of Nassau, in the Berlin Library, of an animal from Guiana, and hence requires no further consideration.

The forms of the group heretofore recognized are:

Tayra barbara barbara (Linn.). Guiana, Venezuela, and Brazil.
Tayra barbara peruana (Tschudi).[1] Peru, east of the Andes.
Tayra barbara senex (Thomas). Mexico.
Tayra barbara biologiæ (Thomas). Central America.
Tayra barbara trinitatis (Thomas). Trinidad.
Tayra barbara brunnea (Thomas). Western Bolivia.
Tayra barbara irara Allen (as above). Northeastern Colombia.

17. **Nasua narica** (*Linn.*). Seven specimens, March 11–16 and April 16. They are mostly only about two thirds grown, but two are young adults. These, male and female, measure, respectively: Total length, ♂ 1143, ♀ 980; tail vertebræ, ♂ 550, ♀ 475; hind foot, ♂ 105, ♀ 100. Skulls: Total length, ♂ 128, ♀ 122; zygomatic breadth, ♂ 60, ♀ 58. Old specimens would be much larger, especially in the cranial measurements, and particularly in zygomatic breadth.

[1] *Galictis barbara* Tschudi, Fauna Peruana, 1844–46, 107. Description based on a Peruvian specimen in captivity.
Galictis barbara var. *peruana* Tschudi, Wiegm. Arch., 1844, i, 248. Based on the description in 'Fauna Peruana.'
In this description Tschudi states that, like many other mammals and birds common to Peru and Brazil, the Peruvian representatives are not quite the same as the Brazilian; although the color pattern is the same, the Peruvian animals are much more intensely colored; but he considers such differences local and climatic, and not really of specific value. He notes further that his description of what he here designates *Galictis barbara* does not agree altogether with Brazilian examples. In his 'Mammalium conspectus quæ in Republica Peruana reperiuntur et pleraque observata vel collecta sunt in itinere a Dr. J. J. de Tschudi' (Wiegm. Arch., 1844, i, pp. 244–255, dated Dec., 1843), he appears to have decided to recognize the Peruvian form of this animal as a variety, referring to the 'Fauna Peruana' as the basis for the name. As no page or plate reference is given, in this as in other cases in the 'Conspectus' where new names appear, it is probable that the 'Fauna,' although in press, had not at that time appeared, and that the new names (17 in number) employed in the 'Conspectus' were nomina nuda until Volume I of the Fauna was published. This ('Therologie,' half-title, following p. xxx) is dated 1844; but there is internal evidence that it could not have appeared prior to July, 1845 (see p. 262, footnote). As in the interval between the publication of the 'Conspectus' and the mammal part of the 'Fauna' no other name was proposed for the Peruvian Tayra, it seems admissible to adopt *peruana* from Tschudi, as was done by Dr. Nehring in 1866 (Zool. Jahrb., 1886, i, p. 206).
All of the other new names in the 'Conspectus' appear also in the 'Fauna,' and their status is thus without question. This includes Tschudi's *Cervus nemorivagus* var. *peruana* (Conspectus, *l. c.*, p. 255), which, while not adopted in the text (Fauna, p. 240), appears in the 'Systematische Zusammenstellung' on p. 20. This antedates by about ten years Wagner's *Cervus tschudii* (Schreber's Säugth., Suppl., V, 1855, pp. 386, 387), based wholly on Tschudi's description. The Peruvian Brocket will thus stand as **Mazama peruana** (Tschudi).

18. **Alouatta palliata mexicana** *Merriam.* Nineteen specimens, 16 adult and 3 nursing young, March 15 and April 8–19. Four adult males and 6 adult females have external measurements as follows:

♂,	Total length,	1142:	tail	vertebræ,	585;	hind	foot,	145.
♂,	"	"	1140;	"	"	620;	"	"	153.
♂,	"	"	1212;	"	"	635;	"	"	152.
♂,	"	"	1115;	"	"	604;	"	"	153.
♀,	"	"	1189;	"	"	661;	"	"	150.
♀,	"	"	1123;	"	"	630;	"	"	148.
♀,	"	"	1119;	"	"	605;	"	"	148.
♀,	"	"	1110;	"	"	620;	"	"	146.
♀,	"	"	1107;	"	"	618;	"	"	152.
♀,	"	"	1100;	"	"	625;	"	"	148.

Eight adult skulls, 3 males and 5 females, measure: Basal length, (inner base of incisors to posterior border of occipital condyles), 3 males, 92.5 (90–96); zygomatic breadth, 80.5 (78.5–83): 5 females, basal length, 83.4 (81–87); zygomatic breadth, 70 (68–72).

Dr. Merriam, in separating this form (Proc. Biol. Soc. Wash., XV, p. 67, March 22, 1902), indicated the distinctive cranial features, but said nothing of the external differences, which prove to be equally striking. Compared with a series of seven specimens from Chiriqui, collected by Mr. Batty, the Mexican form proves to be much duller colored, with the flanks in the brightest specimens as obscurely colored as in the very palest of the Chiriqui examples, none of them presenting the golden rufous so characteristic of the latter. (See below, p. 80.) The sides of the back are yellowish gray washed with blackish, with the long hairs at the lower edge of the flanks dull yellowish gray with dull brownish tips, instead of rich golden with the tips almost golden chestnut.

The young in first pelage are dull, dingy gray, varied slightly with a wash of blackish, especially on the head, middle of the back, limbs, and tail.

19. **Ateles pan** *Schlegel.* Represented by 22 specimens, mostly adult, but including a few young adults, and one in first pelage, collected March 5–April 19.

Similar to *A. vellerosus*, but with little or no white on the sides of the head, and the inside of the arms and legs mostly black.

In *Ateles vellerosus* the inside of the arms down to the hands, and the whole inside of the thighs and the legs to the feet are broadly yellowish white. In *A. pan* there is a narrow whitish stripe on the inside of the shoulder, rapidly narrowing distally and rarely extending more than half-way to the elbow, the fore arm being black all around. The light color of the underparts extends down the inside of the thighs and hind legs, rapidly narrowing distally, usually about to the knees, but sometimes as a very narrow, indistinct light line to the feet, consisting often merely of scattered grayish hairs, but never forming a broad band as in *vellerosus*.

The whitish patch on the sides of the face is either almost wholly absent, or is represented by an indistinct cluster of whitish hairs opposite the angle of the mouth, but not extending up to the sides of the forehead, as in *vellerosus*.

Measurements.—The 7 largest males and the 7 largest females which have measurements (for several they are not given) measure as follows:

♂,	Total length,	1310;	tail vertebræ,	832;	hind foot,	183.
♂,	"	"	1275;	"	"	815;	"	"	191.
♂,	"	"	1210;	"	"	670;	"	"	161.
♂,	"	"	1197;	"	"	721;	"	"	172.
♂,	"	"	1148;	"	"	820;	"	"	175.
♂,	"	"	1142;	"	"	605;	"	"	175.
♂,	"	"	1109;	"	"	706;	"	"	165.
♀,	"	"	1250;	"	"	822;	"	"	180.
♀,	"	"	1235;	"	"	820;	"	"	175.
♀,	"	"	1232;	"	"	791;	"	"	174.
♀,	"	"	1231;	"	"	792;	"	"	179.
♀,	"	"	1160;	"	"	740;	"	"	170.
♀,	"	"	1152;	"	"	770;	"	"	170.
♀,	"	"	1150;	"	"	630;	"	"	163.

While the teeth show that these specimens are fully adult, the sutures and slight development of the temporal ridges indicate that the greater part are comparatively young or middle-aged adults. One male has the teeth greatly worn, and one female has them considerably worn. These measure, respectively, basal length, ♂ 88, ♀ 81; zygomatic breadth, ♂ 72, ♀ 62. The others grade smaller, according to age. A fully adult but not 'old' skull gives the following: Total length, 108; basal length (inner base of incisors to posterior border of occipital condyles), 77; zygomatic breadth, 64; mastoid breadth, 59; orbital breadth, 55; length of palate, 29; length of nasals (following curvature), 18; width of nasals, 8, at front margin, tapering to a point posteriorly; upper premolar-molar series, 25; length of lower jaw

(front of incisors to posterior border of condyles), 69; height at condyle, 38; height at coronoid process, same as at condyle; length of lower premolar-molar series, 27.5.

Adults of the same sex present a rather wide range of variation in color, wholly independent of sex or age. In the darkest specimens the head, neck, limbs, and tail are deep black; the shoulders and dorsal region are brownish black, the black being less intense and slightly suffused with a ruddy cast, becoming still paler and lighter on the posterior half of the dorsal region, especially on the loins, where the suffusion is paler and more yellowish; a narrow lateral line of dark yellowish rufous runs from the shoulders to the thighs; ventral surface yellowish gray, which color extends in a narrow line down the inside of the upper arm to the elbow, and down the inside of the thighs to a little below the knee, narrowing distally.

In the lightest examples the head, distal half of the limbs, and tail are dull black; the nape, shoulders, and the proximal half of the limbs and tail brownish black, with a strong dull yellowish red suffusion; the dorsal area posterior to the shoulders is dingy golden yellow, brightening on the sides to brilliant golden rufous, terminating abruptly against the lighter color of the ventral surface in a sharply limited lateral line of deep golden rufous, which is prolonged posteriorly over the upper part of the thighs and down the inner side of the hind legs to below the knees; ventral surface clear yellowish white. Between these is every stage of gradation.

In the lighter-colored specimens there is a striking similarity in the tints and in the pattern of coloration to *Alouatta palliata mexicana*, which occurs abundantly with it at Pasa Nueva, but the darker under surface of the latter readily distinguishes the two species without resort to other characters.

The single very young specimen in first pelage is very thinly haired, the ventral area being practically naked. The whole dorsal area, limbs, and tail are uniform blackish.

The type of *Ateles vellerosus* Gray (P. Z. S., 1865, p. 733; Cat. Monkeys, etc., 1870, p. 44) was supposed by the describer to have come from Brazil, but later Alston (Biol. Centr.-Am., Mamm., 1879, p. 10) considered it identical with specimens from Central America. In the meantime Sclater figured under this name (P. Z. S., 1872, p. 4, pl. ii) a specimen believed to have been procured near Acapulco, Mexico, which he considered as indistinguishable from Gray's type. The authenticity of this locality was soon after questioned by Reinhardt (P. Z. S., 1872, p. 797), who, however, referred specimens to *vellerosus* from Mirador, Vera Cruz, "although the yellowish

colour on the inside of the hind limbs does not extend so far down to the hands" as in Sclater's specimen, "and the whiskers offer only a faint trace of the whitish colour which encircles the face" of *vellerosus*. Reinhardt says of his Mexican specimen: "I have hitherto considered it a new species and given it a provisional name"; but he appears to have never published this provisional name. But Schlegel's *Ateles pan* (Mus. Pays-Bas, VII, 1876, p. 180), from near Coban, Guatemala, appears to have been based on specimens very similar to those of the present series from Vera Cruz. He compares his specimens with his "*Ateles fuliginosus* Kuhl" (= *A. vellerosus* Gray), and refers especially to the absence of the light color on the forearms and on the posterior extremities. The present series is therefore referred provisionally to Schlegel's *Ateles pan*, to which a single specimen collected by Dr. Buller at Chimalapa, Tehuantepec, formerly identified with *Ateles vellerosus* (this Bulletin, III, 1890, p. 176), is also referable.

II. — Central Costa Rica.

The collection here under notice was made for the Museum by Mr. M. A. Carriker, Jr., during the period from February to July, 1902, mostly in or near the Irazu Range in central Costa Rica. The collection numbers about 120 specimens, referable to 23 species. The principal localities at which collections were made are "Mount Irazu," Feb. 23 to April 21, part of the specimens (collected Feb. 23 to March 6) being labeled simply "Mount Irazu"; a part (collected March 13–22), "Juan Viñas, Mount Irazu" (altitude 1113 meters); and others (collected April 2–21), "Rancho de R. Jimenez" (altitude about 1100 meters). Later, specimens were collected at "Pozo Azul, Pirris Province" (May 14–26 and July 1–23), at San José (July 21), and at San Pedro, near San José (July 29). Pozo Azul is on the Pacific slope, at an altitude of about 200 meters.

1. **Caluromys laniger pallidus** (*Thomas*). One specimen, female, San José, July 21.

This specimen is gray, with a pale brownish tinge over the shoulders and on the middle of the back, but wholly lacks the usual gray shoulder stripe of the *laniger* group. It therefore agrees very closely with what may be regarded as the average condition of *C. l. pallidus*, judging from Mr. Thomas's description. The specimen is a full-grown female, and measures as follows: Total length, 665; tail vertebræ, 405; hind foot, 40.5.

2. **Metachirus fuscogriseus** *Allen.* Four skins and skulls of two-thirds grown specimens, and an adult skull, from Juan Viñas, March 14–16.

3. **Didelphis marsupialis etensis** *Allen.* One skin, without skull, Pozo Azul, May 26.

4. **Mazama sartorii** (*Saussure*). One specimen, a young male, Pozo Azul, July.

5. **Sciurus (Echinosciurus) thomasi** *Nelson.* One specimen, an old male, Pozo Azul, March 14. Total length, 460; tail vertebræ, 230; hind foot, 59.

6. **Sciurus (Guerlinguetus) hoffmanni** (*Peters*). Ten specimens, all adult, collected as follows: Volcan de Irazu, 5, Feb. 24 and March 2–5; Rancho de R. Jimenez, 3, April 5–8; Pozo Azul, 2, June 18.

These specimens vary greatly in color, especially the ventral surface, and are fairly separable into two series, those with orange-yellow bellies and those with reddish orange bellies, there being four of the former and six of the latter. As, however, specimens of each were taken the same day at the same locality, and each series includes both sexes, the variation is evidently purely individual. The upper surface varies correspondingly, as does the tail, in which the color of the fringe varies from yellow (one specimen) to deep reddish orange.

These specimens, taken collectively as a series, do not differ appreciably from a series of 14 examples from Chiriqui, Panama, or from specimens from other localities in Costa Rica, in which pale-bellied specimens are also more or less frequent.

The collector's measurements of 4 males and 3 females are as follows:

♂,	Total length,	420;	tail vertebræ,	215;	hind foot,	55.
♂,	" "	393;	" "	190;	" "	55.
♂,	" "	382;	" "	180;	" "	55.
♂,	" "	375;	" "	167;	" "	51.
♀,	" "	405;	" "	198;	" "	57.
♀,	" "	380;	" "	173;	" "	51.
♀,	" "	385;	" "	172;	" "	55.

7. **Mus musculus** *Linnæus*. Three specimens, Volcan de Irazu, Feb. 23 and March 3.

8. **Mus rattus** *Linnæus*. Three specimens, Juan Viñas, March 14–16.

9. **Peromyscus nudipes** (*Allen*). Nineteen specimens, Rancho de R. Jimenez, Juan Viñas, and other neighboring points in the Irazu Range, Feb. 25–April 4. (For measurements, etc., see below, p. 68.)

10. **Oryzomys devius** *Bangs*. Two old adults, Volcan de Irazu, March 4.

These specimens are in heavier pelage and rather more deeply colored than topotypes of *O. devius* from Boquete, Chiriqui, and are also older, but on the whole agree so well with them, especially in cranial characters, that they are provisionally referred here.

11. **Oryzomys couesi** (*Alston*). One specimen, adult female, Rancho de R. Jimenez, Volcan de Irazu, April 13.

12. **Reithrodontomys costaricensis** *Allen*. Ten specimens, 6 adults and 4 young, San Pedro, June 29. The adults measure: Total length, 189 (182–205); tail vertebræ, 112 (103–121); hind foot, 20.3 (19.5–20.5). The young specimens, two-thirds grown, resemble in coloration an average example of *Mus musculus*, excepting a tinge of bright rufous on the head, shoulders, and flanks, due to the incoming of the adult coloration.

13. **Reithrodontomys australis** *Allen*. Twenty-five speci-

mens (topotypes), Volcan de Irazu, Feb. 23 and 24, and March 1–6.

Nine adult males: Total length, 163 (155–174); tail vertebræ, 86 (83–96); hind foot, 19 (18–20). The largest specimen of the series is a female, the collector's measurements being: 185, 96, 20. As this species was described from a single skin and skull from Volcan de Irazu, this series of topotypes with flesh measurements helps to complete the description. The type proves to represent the adult condition of the species.

14. **Akodon irazu,** sp. nov.

Type, No. 18128, ♀ ad., Volcan de Irazu, Feb. 23, 1902; M. A. Carriker, Jr.

Smaller, with relatively smaller ears, than either *Akodon teguina* or *A. xerampelinus* Bangs, with the upper parts lighter and more yellowish brown, and the under parts buffy brown instead of cinnamon brown. *A. teguina* is even darker and more blackish than *A. t. apricus*.

Total length (type), 125; tail vertebræ, 50; hind foot, 17. The type is an old female with the teeth much worn. Six adult topotypes: Total length, 132 (121–140); tail vertebræ, 51 (50–53); hind foot, 17.3 (17–19).

Skull (type), occipito-nasal length, 22; basal length of Hensel, 17; zygomatic breadth, 11.5; mastoid breadth, 10; interorbital breadth, 4; length of nasals, 8.3; palatal length, 8; upper toothrow, 4; lower jaw, condyle to base of incisors, 11.

Represented by 8 specimens, collected on the Volcan de Irazu, Feb. 23 and 24, and March 3–6.

This species is readily distinguished from its nearest allies by its smaller size and paler coloration, as indicated above.

15. **Macrogeomys heterodus** (*Peters*). One specimen, Sabanilla, near San José, July 2.

Total length, 228; tail vertebræ, 58; hind foot, 37. General coloration above, very dark seal brown, with scattered, long, bristly, whitish hairs, most numerous and rather conspicuous on the sides; no white mark on the head; lower parts soiled grayish white, sharply defined against the dark color of the dorsal surface; tail short, naked; feet nearly naked, apparently brownish flesh color in life; claws short and weak, in comparison with those of *M. cherriei* and allied forms.

16. **Lepus (Tapeti) gabbi** (*Allen*). Three specimens,—two

from Rancho de R. Jimenez, April 21, and one from Juan Viñas, March 22.

17. Felis carrikeri, sp. nov.

Type, No. 19211, ♀ ad., Pozo Azul, Pirris Province, Costa Rica, May 14, 1902; A. M. Carriker, Jr., for whom the species is named.

A small, short-tailed cat, with full, soft pelage. Above, from the nose to the end of the tail, brownish black, quite black over the whole dorsal area, lighter and browner on the lower border of the sides, passing gradually into the very dark chocolate brown of the ventral surface; outside of limbs very dark chocolate brown, irregularly and rather indistinctly clouded with blackish brown; inside of limbs like the ventral surface, indistinctly blotched with darker spots; ears externally blackish brown, like the top of the head; lips and cheeks uniform blackish, like the rest of the head; tail above uniform brownish black, like the middle of the back, lighter and slightly clouded with darker on the sides and below.

Measurements. — Total length, 970; tail vertebræ, 276; hind foot, 101. Skull, total length, 86; basal length of Hensel, 73; zygomatic breadth, 55; least interorbital breadth, 16; intertemporal breadth, 28; width of braincase above meatus auditorius, 38; length of nasal bones, 18; breadth of nasal bones across anterior border, 11; do. opposite nasal process of frontals, 6.2; audital bulla, 18 x 10; breadth at posterior end of carnassials, 30.5; front of canine to posterior border of carnassial, 25; length of upper carnassial, 10; length of lower carnassial, 7.5; length of lower jaw (front base of incisors to end of angular process), 55; height of jaw at condyle, 11.5; do. at coronoid, 21.5.

Contour and proportions of the skull as in *Felis apache* and *Felis fossata* Mearns (Proc. Biol. Soc. Wash., XIV, pp. 149–151, August 9, 1901), but smaller and lacking the nasal fossa of the latter, in this respect agreeing with *F. apache*. The skull here described is that of an adult (middle-aged) female.

The dark coloration of the type specimen and the obscure spotting on the limbs suggests a melanism of some form of the *F. pardalis* group, or that it may be, normally, a short-tailed spotted cat. Its small size, as affirmed by the size and age conditions of the skull, renders it, however, impracticable to refer it to any of the known forms of the *pardalis* group, the smallest of which enormously exceeds in size the type of *Felis carrikeri*. On the other hand, the skull agrees very closely in size with the smallest of the small-headed, long-tailed spotted cats of South America, but the shortness of the

tail separates it from this group and allies it, in proportions, with the *Felis eyra* group, of which it appears to be a small, dark form.

18. **Urocyon guatemalæ** *Miller.* Two specimens, an adult female and a two-thirds grown male, from Pozo Azul, July 17.

The adult female agrees very closely in size, cranial characters, and coloration with topotypes of Mr. Miller's *U. guatemalæ*, except that the whole dorsal area is much blacker, and the ears, sides of the neck, outer edges of the limbs, and under surface of the tail are darker, being ochraceous brown instead of "tawny ochraceous." On the back the black tips of the hairs are so long and abundant that the prevailing color of the middle portion of the back is black. The audital bullæ are also less inflated. Probably additional material would show the desirability of recognizing the Costa Rican animal as subspecifically separable from *U. guatemalæ.*

19. **Conepatus (Marputius) marpurito** *(Gmelin).* Two specimens, an adult female from Pozo Azul, June 6, and a young male from Rancho de R. Jimenez, April 21. Female, total length, 610; tail vertebræ, 175; hind foot, 49.

These specimens are very different from *C. tropicalis*, from the eastern coast of Mexico, both in coloration and in the form of the skull. In the absence of Colombian specimens of true *C. marpurito*, they are provisionally referred to it on the basis of Mr. Thomas's statement (Ann. and Mag. Nat. Hist. (7), V, June, 1900, p. 500) that "true *C. marpurito* . . . occurs at Bogota and north-westwards into Central America."

20. **Nasua narica bullata,** subsp. nov.

FIGURE 10.

Type, No. 19210, ♂ ad., Pozo Azul, Pirris Province, Costa Rica, June 23, 1902; A. M. Carriker, Jr.

General color very dark throughout, much darker than in any of the Mexican forms, with large, greatly inflated bullæ, and small teeth in comparison with *N. n. molaris* Merriam.

General color dark brown. In the type the whole head, except the ears and usual light facial areas, is brownish black, the feet deep black,

the middle of the dorsal region deep brownish black, with the hairs tipped yellowish, the sides dark brown, and the ventral surface dark brown with the tips of the hairs lighter; throat and chest soiled whitish; tail dark brown above, lighter on the sides and below, darkening

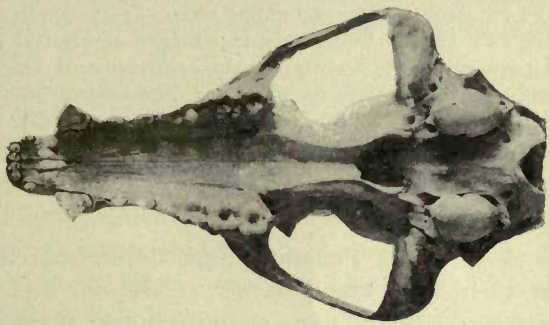


Fig. 10. *Nasua narica bullata.* No. 19210, ♂ ad. Type. ½ nat. size.

to nearly black towards the tip. The type is in rather worn pelage, with the new coat coming in. Another specimen (U. S. Nat. Mus. No. $\frac{12}{141}\frac{134}{194}$, Talamanca) in full fresh pelage is less dark, the head being dark yellowish brown, the feet dark brown, and the long hair over the shoul-

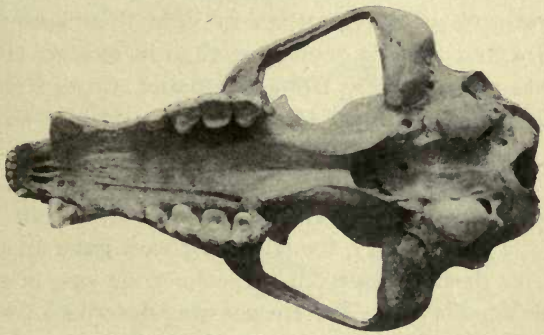


Fig. 11. *Nasua narica molaris.* No. 6676, ♂ ad. San Felipe de Hijas, Jalisco, Mexico. ½ nat. size. For comparison with Fig. 10.

ders and anterior part of the dorsal region with long, rich, yellowish brown tips; chin yellowish white; chest with the basal half of the pelage rusty brown and the tips of the hairs pale yellowish.

Measurements. — Total length (type, ♂), 1119; tail vertebræ, 587; hind foot, 133. Skull, occipito-nasal length, 140; basal length of

Hensel, 123; zygomatic breadth, 78; interorbital breadth, 28; width of braincase, 45; length of upper molar series, 21.5; length of lower molar series, 26; audital bulla, 17 x 11; height of sagittal crest, 6. Another specimen, probably male, occipito-nasal length, 146; basal length, 128; zygomatic breadth, 81; interorbital breadth, 31; width of braincase, 47; length of upper molar series, 22.5; length of lower molar series, 25; audital bulla, 17 x 12; height of sagittal crest, 8. Still another specimen, apparently female, occipito-nasal length, 137; basal length, 120; zygomatic breadth, 82; interorbital breadth, 33; width of braincase, 49; length of upper molar series, 22; audital bulla, 16 x 12; height of sagittal crest, 5. These skulls, while apparently old, with closed sutures and highly developed crests, have the teeth very little worn.

The Costa Rica and Panama Coatis differ from those of Mexico in their very much darker coloration, and in the greatly increased size and more elongated form of the audital bullæ, which are one-fifth longer than in an old male of *N. n. molaris* from southern Jalisco, and nearly twice the size of those of true *N. narica* from eastern Mexico. Compared with *molaris* of equal age and the same sex, the skull is longer and narrower, the zygomatic breadth being 4 mm. less, and the zygomatic arch is much more strongly curved upward; the dental armature is heavier than in Vera Cruz specimens of true *narica*, but far less developed than in *molaris* (Fig. 11). Two additional specimens from Talamanca, Costa Rica (U. S. Nat. Mus. Nos. $\frac{121933}{141933}$ and $\frac{121934}{141934}$) agree in cranial characters with the type.

Apparently Linnæus based (Syst. Nat., 1766, I, p. 64) his *Viverra nasua* wholly on Brisson's *Le Coati-Mondi* (Règne Animal, 1, 1756, p. 262), for which Brisson gave no locality, but took his description from a specimen he saw in the possession of Mr. Lievre. The species was described by Buffon in 1760 as *Le Coati brun*, from a specimen he had alive, but he gave no indication of its original source. Linnæus gave the habitat as "America."[1] There is no doubt, however, that both Brisson's and Buffon's specimens came from eastern

[1] In my paper 'On the Coatis (Genus *Nasua*, Storr),' published in 1879 (Bull. U. S. Geogr. and Geolog. Surv. Territories, V, No. 2, Sept., 1879, pp. 153–174), I inadvertently stated (*l. c.*, pp. 162, 166) that *Viverra nasua* Linn. was based entirely on Buffon, Buffon being a lapsus for Brisson.

Mexico, and the State of Vera Cruz may be considered as the type region of the species.[1]

The later names given to the Mexican species must be treated as synonyms of *N. narica*, none of them being distinguishable from it by any of the assigned characters or localities.

The material available for examination shows that the Coatis from widely separated localities in Mexico and Central America vary greatly in general coloration and size, in the relative size of the teeth, and in the size and shape of the audital bullæ, which variations form a basis for the separation of the group into a considerable number of geographical forms, in addition to those already recognized.[2] Several are here indicated, as follows:

Nasua narica panamensis, subsp. nov.

FIGURE 12.

Type, No. 18901, ♀ ad., Boqueron, Chiriqui, Oct. 29, 1901; J. H. Batty.

In coloration not readily distinguishable from *N. narica bullata*, being very dark and highly colored, but much smaller, and with the bullæ of the usual size for the *narica* group. Top of head, nape, and

Fig. 12. *Nasua narica panamensis.* No. 18901, ♀ ad. Type. ½ nat. size.

shoulders rusty brown; anterior half of back yellowish gray brown, darkening on the posterior half of the back and rump to dusky brown, the hairs tipped with yellowish gray; ears and sides of shoulders yellowish white; feet and tail dark brown, the latter darkening apically.

[1] For a discussion of the synonymy and geographical distribution of the species of *Nasua* see the paper cited in the preceding footnote.

[2] *Nasua nelsoni* Merriam. Cozumel Island, Yucatan.
Nasua narica (Linn.). Southeastern Mexico.
Nasua narica molaris Merriam. Southwestern Mexico.
Nasua narica bullata Allen (as above). Costa Rica.

Measurements. — Total length (type, ♀), 1080; head and body, 540; tail vertebræ, 540; hind foot, 116; ear, 40. Skull, occipito-nasal length, 122; basal length of Hensel, 108; zygomatic breadth, 60; interorbital breadth, 25; width of braincase, 44.5; length of upper molar series, 21; audital bulla, 13 x 9.5. Another female (No. 10125, Bangs Coll.), from Boquete, is slightly smaller.. Both are middle-aged adults, with undeveloped crests, and the sutures of the rostral portion of the skull still well-defined. Another specimen (No. 10123, Bangs Coll.), sex not indicated, but apparently a male, very old, with closed sutures and well developed sagittal and occipital crests, is rather larger than the type, the occipito-nasal length being 130; the basal length, 112; the zygomatic breadth, 77; the audital bulla, 13 x 9.5; sagittal crest, 6.

N. narica panamensis probably differs very little in average coloration from *N. n. bullata*, both forms presenting the usual wide individual range of color-variation seen in all the forms of *Nasua*, but it is apparently very much smaller, with the audital bullæ nearly one half less. From *N. narica* it differs markedly through its much darker general coloration, and still more so in this respect from the forms of the more arid portions of Mexico.

Nasua narica yucatanica, subsp. nov.

Type, No. $\frac{18037}{10488}$, ♂ ad., Chichenitza, Yucatan, March 11, 1896; Frank M. Chapman.

General color above, including the tail, pale brownish yellow; hairs of the upper surface, individually, ochraceous buff, with the tips slightly brownish over the hinder portion of the dorsal region, and yellowish white on the shoulders; sides of shoulders, sides of neck, and proximal two-thirds of fore limbs pale cream color, the light tips of the hairs very long; ventral surface pale reddish brown, with the tips of the hairs whitish; the dark areas on the face and the fore and hind feet dark chocolate brown; tail all around pale buff, darker and slightly browner at the tip.

Measurements. — Total length, 1150; tail vertebræ, 550; hind foot, 100. Skull (very old male), occipito-nasal length, 130; basal length (inner base of incisors to posterior border of condyles), 120; zygomatic breadth, 77; interorbital breadth, 29; width of braincase, 43; length of upper molar series, 18; length of lower molar series, 23.3; height of sagittal crest, 6.5; audital bulla, 14.6 x 10.

Nasua narica yucatanica is a small, pale form, from the arid districts of Yucatan. While it considerably exceeds in size the

very small *Nasua nelsoni* from Cozumel Island, it is much smaller than *N. narica* from eastern Mexico, and much paler, more yellow even, than specimens from southern Chihuahua. At first sight the type looks like a bleached specimen, but proves on examination to be in excellent, unworn pelage. The skull shows that the specimen was very old (the upper teeth are more or less defective from caries, but are not greatly worn). The general form of the skull is narrow, and the teeth are very small even for the small size of the skull, the three posterior upper molariform teeth having a length of 18 mm. against 21 mm. in *N. narica* from the State of Vera Cruz, and they are even more reduced in general size, the last upper molar having a transverse diameter of 6 mm. against 7.6 mm. in *narica*. The palatal region is very narrow, especially the portion posterior to the molars, where the least width is 15.5 mm. as compared with 19 mm. for the same measurement in *narica*.

Since writing the above I have received, through Mr. Gerrit S. Miller, Jr., in charge of mammals at the U. S. National Museum, a specimen of Coati from Brownsville, Texas, collected by the late Dr. J. C. Merrill, that agrees strikingly in coloration and small size with the specimen from Yucatan, it having the same dull, yellowish underfur, rusty yellow head, the long, yellowish gray tips to the hairs of the dorsal surface, and the very light underparts. Without further material it would be rash to attempt to separate subspecifically the Rio Grande and Yucatan Coatis.

In my paper on the genus *Nasua*, published in 1879 (*l. c.*, p. 163), I referred at length to this Brownsville specimen, in commenting on the wide range of geographical variation in the Coatis of Mexico and Central America, "the Mexican specimens being much lighter-colored than those from Guatemala and Costa Rica," etc.

Nasua narica pallida, subsp. nov.

Type, No. 7125, adult, skin without skull, Sierra Nevada (vicinity of Guadalupe y Calva), Chihuahua, Mexico; Dr. Carl Lumholtz.

General color above pale brown, the hairs for their basal three-

fourths pale buff or buffy white, then broadly ringed with dark brown and broadly tipped with pale yellowish; top of head and nape pale yellowish brown; inner surface of ears, the light facial markings, sides of neck, sides of shoulders, and proximal two-thirds of fore limbs white; tail very pale brownish yellow, a little darker on the terminal fifth; ventral surface and flanks lighter than the back; feet dark brown; dark facial markings pale chocolate brown.

Measurements. — Total length (approximate, from a flat skin, probably stretched), 1200; tail vertebræ, 515. (There is no skull.)

Based on 5 flat skins (hunter's pelts), obtained by Dr. Lumholtz in the vicinity of Guadalupe y Calva, southeastern Chihuahua, in 1892. While very unsatisfactory material, they suffice to show the existence of a pallid form of Coati in this arid region. These five skins vary considerably in color, individually, as Coatis usually do, but agree in the essential feature of excessive pallor, as compared with specimens from southern Sinaloa, Jalisco, and eastern Mexico. The general character of the coloration, however, is quite different from that of the pallid form from Yucatan and Brownsville, Texas.

21. **Ateles geoffroyi** (*Kuhl*). Five specimens (2 males, 3 females, all adult), Pozo Azul, June 13–15 and July 5.

The color of the upper parts varies from deep chestnut rufous to pale brownish rufous, more or less suffused with yellow, especially over the shoulders and anterior half of the back; the lower surface is deep rich rufous in all, varying somewhat in intensity in different specimens.

The collector's measurements are as follows:

♂,	Total length,	1520;	tail vertebræ,	950;	hind foot,	170.
♂, yg. ad.	"	"	1160;	"	"	675;	"	"	165.
♀,	"	"	1320;	"	"	824;	"	"	—.
♀,	"	"	1250;	"	"	785;	"	"	172.
♀,	"	"	1207;	"	"	737;	"	"	178.

The two oldest skulls measure, respectively: Basal length, ♂ 81, ♀ 82; zygomatic breadth, ♂ 67, ♀ 67.5.

22. **Cebus hypoleucus** (*Humboldt*). Five specimens, 2 males and 3 females, all adult, Pozo Azul, June 15 and 23 and July 4.

One of the females has elongated brownish hairs on the frontal region (*Cebus imitator* Thomas), while in other cases the males and females are alike in having the hairs of this region of the same length and color in both sexes.

23. **Saimiri œrstedii** (*Reinhardt*). Five specimens, Pozo Azul, Perris Province, May 31 and July 3, adult and young. In the young the cap is gray washed with black, the middle dorsal region is dull yellowish with a wash of dusky gray, and the feet are yellowish gray. In the young adults the middle of the back is more or less strongly varied with black, and the cap is blackish instead of deep black as in the adults.

III. — Chiriqui, Republic of Panama.

This collection was made by Mr. J. H. Batty, during the years 1900 and 1901, mainly at or near Boqueron and Boquete, in the Province of Chiriqui, but it also includes specimens from Coiba and other islands off the coast. The collection originally included over one thousand specimens, and contained very large series of all the more common species, such as the Monkeys (three species), Sloths, Anteaters, the large Opossum (*Didelphis*), Spiny Rat, Agoutis, Squirrels, etc., all of which I had an opportunity carefully to examine. Owing to the small amount of funds available for the purchase of such material, care was taken to select from the larger series such specimens as would best show the range of seasonal and individual variation.

It so happened that Mr. Outram Bangs's collector, Mr. W. W. Brown, and Mr. Batty were working in Chiriqui at the same time, and both collected in part at the same localities, but Mr. Brown covered a wider field and did some collecting at much higher altitudes than were visited by Mr. Batty. Mr. Batty, however, had not completed his work, and on leaving for a short visit to New York, the disturbed state of the country prevented his returning to resume it, so that he had to abandon a large number of specimens collected by his native assistants after he left.

A comparison of the present list with Mr. Bangs's excellent

report (Bull. Mus. Comp. Zoölogy, XXXIX, No. 2, April, 1902, pp. 17–51) on Mr. Brown's collection shows that Mr. Brown secured a number of species that were not obtained by Mr. Batty, but they came from altitudes far above the latter's field of work, who did not collect above 5000 feet, while Mr. Brown explored the Volcan de Chiriqui to above 10,000 feet.

Mr. Batty's collection numbers 52 species, all but four of which are from Chiriqui, the others being from Coïba Island.

1. **Marmosa murina mexicana** *Merriam.* Two specimens, Boqueron, Oct. 6 and 31.

2. **Caluromys laniger pallidus** (*Thomas*). Six specimens, all adult: Boqueron, 3, Oct. 25 and Dec. 5; La Parida Island, 3, Nov. 19 and 27.

In coloration these specimens strongly approach *C. l. derbianus*, and are very different from Mr. Thomas's description of his *C. l. pallidus*, of which he says: "General color pale grey throughout, extreme examples being almost white all over, but in other specimens the shoulders, sides of neck, and the middle dorsal region are pale rufous, with an indistinct trace of the grey stripe of *Ph. l. derbianus*." No two of the Chiriqui specimens are alike in coloration; all but one distinctly show the pale gray median stripe over the shoulders seen in *derbianus*, but with varying distinctness, from very clear and strong to subobsolete, while the sides of the neck and shoulders and the middle dorsal region are rufous, varying in different specimens from light, clear rufous to dark, almost chestnut rufous. The other specimen (one of the Parida Island series) has the whole upper parts bright, nearly uniform rufous, even to the proximal half of the fore legs and the entire hind legs, with no trace of the gray stripe on the shoulders. A Costa Rica specimen, from the Irazu Range, is gray with a tinge of rufous on sides of neck, shoulders, and mid-dorsal region, and with a gray stripe over the shoulders. A San José specimen is similar except in lacking the gray shoulder-stripe. A third Costa Rica specimen, from Boruca, has the greater part of the dorsal region light rufous, and merely a trace of the gray shoulder-stripe. None of these

specimens agrees with what I take to be true *derbianus*, represented by four specimens from the Rio Cauqueta, in the Cauca region of Colombia, which have the greater part of the dorsal aspect of the body, and also the limbs, intense light rufous, with a broad, very sharply defined gray shoulder-stripe.

While I provisionally refer the Chiriqui and Costa Rica specimens to *pallidus*, they certainly show that the form is subject to a wide range of individual variation in color, and that the supposed light color and absence of a gray shoulder-stripe fail as distinctive characters of this form.

The Chiriqui specimens are all old adults, as shown by the skull. The external measurements, taken from the collector's labels, are as follows: 3 males, total length, 763 (730–800); head and body, 300 (270–320); tail vertebræ, 463 (450–480); hind foot (without claws), 43 (40–45); ear (from notch), 41 (38–45). Three females: Total length, 740 (725–765); head and body, 285 (280–290); tail vertebræ, 458 (435–480); hind foot, 43 (40–44); ear, 39 (38–40).

The largest male skull measures 64 x 36, the average of the males being about 61 x 35, or the same as the type of *pallidus*. The external measurements, however, are greater, particularly the length of the tail, than those given by Mr. Thomas for the type. [1]

There is much less sexual difference in size than occurs in the *Didelphis* group.

3. **Metachirus fuscogriseus** *Allen*. Six specimens: Boqueron, 5, Oct. 30 and 31, and Nov. 30; locality not given, 1. This latter is a small, very pale female, in worn pelage.

Two very old males (Nos. 18904 and 18907) measure as follows: Total length, 640, 640; head and body, 350, 310; tail vertebræ, 290, 330; hind foot, 47.5, 50; ear, 37.5, 35. Two very old females (Nos. 18903, 18906): 610, 540; 310, 280; 300, 260; 45, 50; 40, 31. The two old male skulls measure, respectively: Total length, 80, 75; zygomatic breadth, 41.5, 41.5; an old female skull, 78 x 40. The sagittal and occipital crests are greatly developed and the teeth are much worn in all three.

[1] Mr. Thomas gives the total length of the type as 587 mm., obviously an error for 687.

The Boqueron specimens agree well with the type of *M. fuscogriseus*, which, however, proves to have been a young adult that had not reached full size. The males have a patch (probably glandular) of pale greenish yellow on each side of the flanks just in front of the thighs; in the females the fur around the edge of the pouch, and also lining it, is bright rusty chestnut.

4. **Didelphis marsupialis etensis** *Allen.* Six specimens, 4 adult and 2 young, Boqueron, August to December. Selected from a large series. (For measurements see this Bulletin, XVI, 1902, p. 277.)

5. **Didelphis marsupialis battyi** *Thomas.* One specimen, male, Coiba Island (a topotype), May 2. (For remarks on the Coiba series of *Didelphis* see this Bulletin, XVI, 1902, pp. 264, 265, and for measurements of the series see *ibid.*, p. 278.)

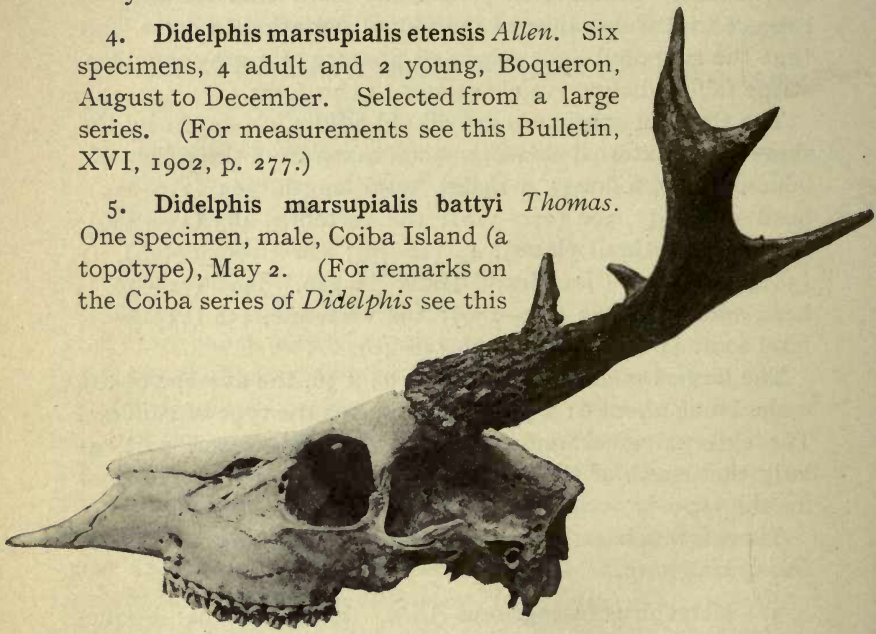


Fig. 13. *Odocoileus rothschildi.* No. 18951, ♂ old ad., Coiba Island, Panama. ½ nat. size.

6. **Cholœpus hoffmanni** *Peters.* Five adults and 3 young, as follows, selected from a large series: Parida Island, 1 adult male, Nov. 22; Boquete, 1 adult female, Sept. 14; Boqueron, 1 adult male, 2 adult females, and 3 young, Oct. 13–24, Nov. 22, and Dec. 1.

Mr. Batty's large series of some 50 specimens shows a wide range of individual variation in color, some being much lighter

or darker than the average; some have a strong greenish tinge over the whole head and shoulders, while others show no greenish tinge whatever.

7. **Cyclopes dorsalis** (*Gray*). One specimen, adult female, Boqueron, Oct. 19. Total length, 422; head and body, 195; tail vertebræ, 227; hind foot, 30; ear, 15.

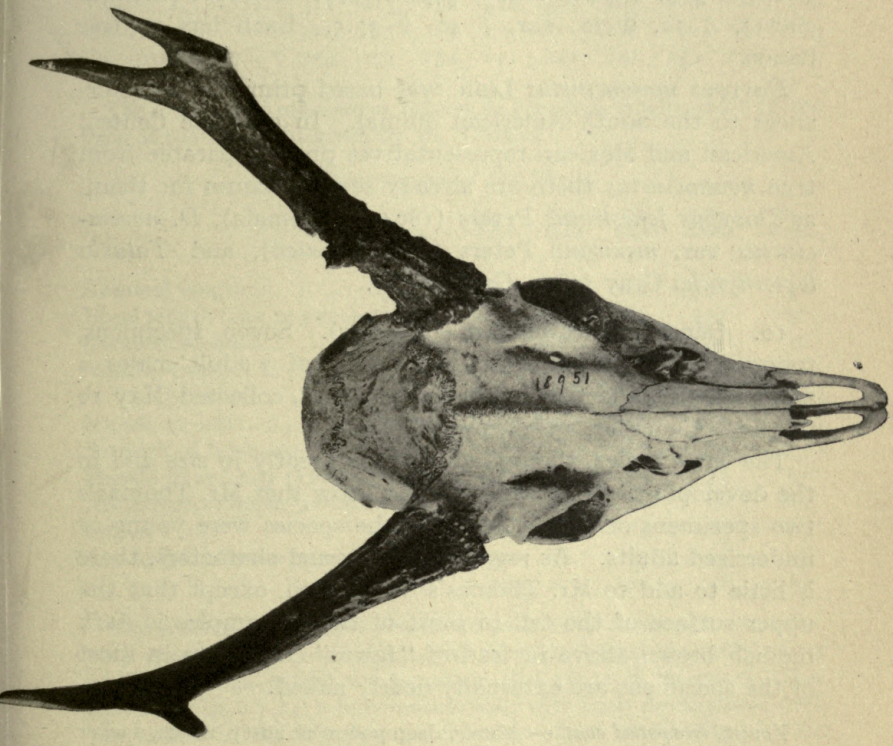


Fig. 14. *Odocoileus rothschildi.* Same skull as Fig. 13. ½ nat. size.

8. **Tamandua tetradactyla** (*Linn.*). Four specimens, all females: Boqueron, 3, Oct. 16 and Nov. 26 and 27; Boquete, 1, Aug. 28. Selected from a large series, showing very wide individual variation in color. The light areas vary from nearly clear white to pale yellowish brown, and the dark areas from brown-black to deep clear black.

The three Boqueron specimens (females), measure respectively: Total length, 1165, 1240, 1120; head and body, 610, 580, 540; tail, 555, 600, 580; hind foot (without claws), 90, 100, 90; ear, 45, 50, 40.

9. **Tatu novemcinctus** (*Linn.*). Three specimens, Boqueron, Oct. 14–26. Total length, ♂ 735, ♀ 680; head and body, ♂ 365, ♀ 340; tail, ♂ 370, ♀ 340; hind foot (without claws), ♂ 70, ♀ 70; ear, ♂ 40, ♀ 37.5. Each has 10 free bands.

Dasypus novemcinctus Linn. was based primarily on references to the South American animal. In case the Central American and Mexican representatives prove separable from true *novemcinctus* there are already several names for them, as *Dasypus fenestratus* Peters (1864, Guatemala), *D. novemcinctus* var. *mexicana* Peters (1864, Mexico), and *Tatusia leptorhyncha* Gray (1873, Guatemala).

10. **Odocoileus rothschildi** (*Thomas*). Seven specimens, topotypes, from Coiba Island, consisting of 3 adult males, 2 adult females, and 2 young in spotted coat, collected May 10 to June 15. (Figs. 13–15, pp. 58, 59, 62.)

The three males, though adult, vary greatly in size and in the development of the antlers, and show that Mr. Thomas's two specimens on which he based the species were young or undersized adults. As regards the external characters, there is little to add to Mr. Thomas's description, except that the upper surface of the tail in most of these examples is dark reddish brown above instead of "fawn." The ears in most of the specimens are externally nearly naked.

Young, in spotted coat. — Above, deep yellowish rusty brown, darker along the median line, forming a well-defined dorsal stripe to a point considerably behind the middle of the back; sides lighter and more yellowish; whole dorsal surface thickly spotted with white, with a tendency to a linear arrangement of the spots; they form two distinct median parallel lines (one on each side of the middle of the back), and the spots are more or less in lines elsewhere; white of under parts and other markings as in the adults.

Mr. Batty has given me the measurements of 10 adults of this species, taken in the flesh, but owing to his omission to number some

of the specimens they cannot be satisfactorily correlated with the specimens. Of these 10 "adults," 7 are males and 3 are females, but evidently they are not of equal age, probably including young and middle-aged animals as well as some old adults.

External Measurements.

	♂	♂	♂	♂	♂	♂	♀	♀	♀
Head and body...	2591	2438	2388	2311	2197	2159	2236	2184	2083
Tail.....	311	215	254	311	305	305	229	229	229
Hind foot	241	235	—	—	—	203	221	191	203
Ear, from base....	254	235	254	241	241	241	254	241	210

The male skulls measure as follows, in comparison with those of the type of the species as given by Mr. Thomas.

Measurements of Six Skulls.

	Type.	No. 18951	No. 18949	No. 18953	No. 18955	No. 18950
	♂	♂	♂	♂	♀	♀
Greatest length.....	201	222	207	211	194	192
Basal length (bas. to gnath.)	180	200	189	189	172	170
Greatest breadth.....	86.5	88	88	90	84	79
Nasals, length.....	64	65	65	70	59	64
" breadth.....	22.5	23	24	23.5	21.3	18.5
Muzzle to orbit.....	103	112	109	111	102	104
Breadth of braincase.....	58	60	55.5	58.6	54.5	55.5
Muzzle to anterior premolar	61	65	62	62	55	56.
Alv. length of upper toothrow	57	66	62	64	58.3	63
Crown " " " "	60	65	63	65	61	65
Alv. length of lower toothrow	65	71	68.7	70	66	71
" " " " "	26	29	27.5	29	28	29

The antlers in the three males, all with fully developed dentition, vary greatly in size and form, two of them being obviously young adults (see Figs. 15–16) and the other (No. 18951 of the above table, shown in Figs. 13–14) a fully mature male with finely developed antlers. The antlers of the two young adults are about as described by Mr. Thomas; those of the old adult are not symmetrical, the right antler being much smaller and with fewer points than the left. The right may be described as a tapering spike, slightly curved outward, 185 mm. long, with a single point on the anterior face, near the tip, about 20 mm. long. The right antler is branched, with a sharp upward curve beginning at the middle; the main beam, following the outside curvature, has a length of 215 mm., with a sharp-pointed sub-base tine, 30 mm. long, branching off from the anterointernal face 50 mm. above the bur, and two other points from the posterior border of the apical third

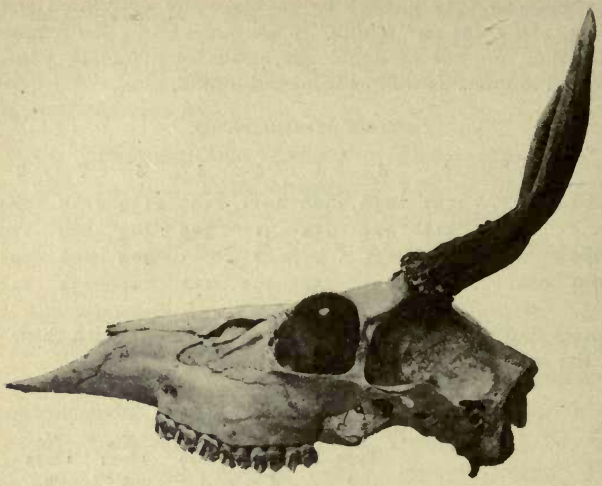


Fig. 15. *Odocoileus rothschildi.* No. 18149, ♂, young ad., Coiba Island, Panama. ⅓ nat. size.

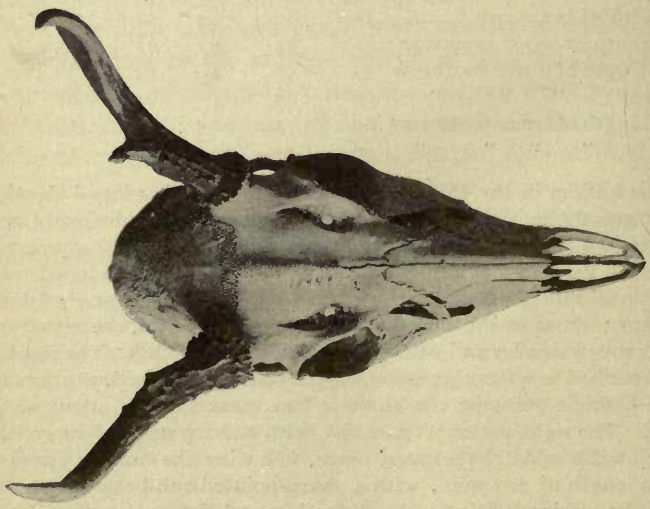


Fig. 16. *Odocoileus rothschildi.* Same skull as Fig. 15. ⅓ nat. size.

of the main beam, the anterior one about 50 mm. long, and the more apical one about 20 mm. long.

O. rothschildi is much darker colored when adult than *O. costaricensis*, and the young are less conspicuously spotted with white; it is also much smaller, as stated by Mr. Thomas, than either *O. costaricensis*, *truei*, or *thomasi*, as shown by a comparison of the skull measurements given above with those of the latter as published by Miller (Proc. Biol. Soc. Wash., XIV, 1901, pp. 36, 37). Two Chiriqui skulls of females of *O. costaricensis*, slightly younger (the last molar not functional) than the two from Coiba Island of which measurements are given above, considerably exceed the latter in size, being about 5–7 mm. broader and 15–20 mm. longer, with proportional increase in bulk, less frontal convexity, and larger antorbital vacuities.

11. **Odocoileus costaricensis** *Miller.* Three skins and skulls (2 adult females and one young in spotted coat), and 9 additional pairs of antlers, Boqueron, Oct. 9 and Dec. 4 and 15.

As said above, *O. costaricensis* is larger and paler, and the young are less conspicuously spotted, than *O. rothschildi.*

The nine pairs of antlers vary greatly in size and massiveness, but with two exceptions are very symmetrical in form. In color they are dark reddish brown, except one pair which is much lighter and was probably taken soon after the shedding of the velvet.

This series is instructive as showing the variation of the antlers in size and form with age, and also the individual variation. Although the antlers vary so greatly in development there is very little variation in the diameter of the brain cavity, which ranges in transverse width from 53 to 56 mm., the youngest specimens having slightly the greatest width of brain cavity. With the advance of age the walls of the skull thicken, so that the breadth of the skull at the postorbital constriction (between orbits and base of horn pedicles) increases from 78 mm. in the two youngest skulls to 88 in the normal adult, and to 99 in the exceptionally heavy pair (No. 21566, Fig. 17 *g* and *g'*).

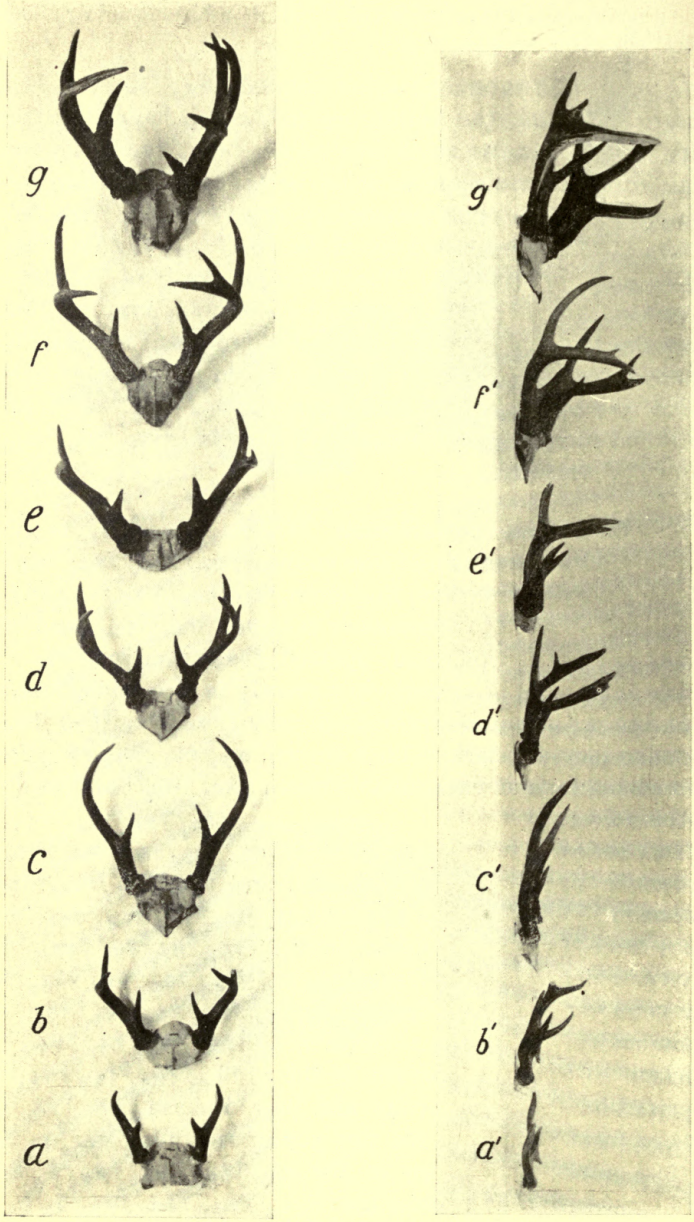


Fig. 17. *Odocoileus costaricensis.* Series of antlers illustrating variation with age. *a*–*g*, front view; *a′*–*g′*, same, side view. About $\frac{1}{10}$ nat. size.

In the youngest pair (No. 21572) the main beam has a length [1] of only 117 mm., is curved inward at the tip, and carries a single point, 27 mm. long, the top of the fork being 44 mm. above the edge of the bur; circumference at base (just above bur), 65. (Fig. 17, *a* and *a'*.)

The next in size (No. 21573) has three points instead of two, the main beam in both antlers being forked at the tip. Length of main beam, 182; of basal tine, 47; of upper tine, 55; circumference at base, 83. (Fig. 17, *b* and *b'*.)

The third pair (No. 21567) is much longer, with a long, slender main beam and only the basal tine. Length of main beam, 280; basal tine, 60; circumference at base, 80. (Fig. 17, *c* and *c'*.)

The fourth pair (No. 21568) is less massive and shorter, but is more forked, the right antler having three points and the left antler four. Length of main beam, 237; circumference at base, 93. (Fig. 17, *d* and *d'*.)

The fifth pair (No. 21569) is thick and heavy but symmetrical, each antler having three points. Length of main beam, 260; circumference at base (just above bur), 112. (Fig. 17, *e* and *e'*.)

The sixth pair (No. 21570, apparently prematurely stripped of the

Fig. 18. *Odocoileus costaricensis.* Malformed antlers. $\frac{1}{10}$ nat. size.

velvet) has the antlers long and slender, each with four points, but the upper one much less developed on the right than on the left. Length of main beam, 315; circumference at base, 100. (Fig. 17, *f* and *f'*.)

The seventh pair (No. 21566) is extraordinarily massive and otherwise evidently somewhat abnormal. Each antler has five points, but

[1] Measurement taken along outside curvature, in all cases. If the two antlers of a pair vary in size, the larger antler is the one measured.

the fifth on the right antler comes off at the inner base of the basal tine, and in the left is produced by the slight forking of the main branch of the antler, which is not, however, homologically the main beam. (Fig. 17, *g* and *g'*.) Length of main beam, 336; circumference at base, 120 (right antler) and 150 (left antler). In the left antler the basal prong is situated close to the bur, in the left at the usual point (about one third the length of the main beam above the bur). The animal that carried these antlers was doubtless very old, as well as very large, the portion of the cranium attached to the antlers being very heavily ossified, giving great breadth to the frontal processes supporting the antlers, while the diameter of the brain cavity is slightly less than in the youngest specimens of the series.

The eighth pair (No. 21571) is curiously malformed, as shown by the photograph reproduced in figure 18. The left antler, the longer of the pair, has a length of only 150 mm., and is abnormally developed throughout, the part that may be homologized as the basal tine starting from the bur, and being one half as long and nearly as massive as the main beam. The left frontal bone at the base of the antler shows exostosis and other unnatural conditions. The chief interest of the specimen is pathological, although it strongly recalls the specimen figured long ago by Pennant, which later became the basis of *Cervus mexicanus* of some of the earlier systematists.

12. **Sciurus (Echinosciurus) melania** (*Gray*). Ten specimens, Boqueron, Sept. 4–Dec. 29; selected from a large series, to show seasonal variation in color and pelage, already well described by Mr. Bangs (*l. c.*, p. 22). His specimens were from Divala, Bogaba, and Boquete, — from sea level to 2000 feet altitude.

13. **Sciurus (Echinosciurus) adolphei dorsalis** (*Gray*). A single specimen from Remedios (collected by D'Arce), of the '*rigidus*' type.

14. **Sciurus (Guerlinguetus) hoffmanni** (*Peters*).

Sciurus (*Guerlinguetus*) *æstuans chiriquensis* BANGS, Bull. Mus. Comp. Zoöl., XXXIX, No. 2, April, 1902, 22.

Fourteen specimens: Boquete, 7, Aug. 22–Sept. 8; Boqueron, 7, Oct. 9–Nov. 25. Selected from a large series, to show seasonal and individual variation.

It appears to me that the Chiriqui animal is indistinguishable from Costa Rica specimens of true *S. hoffmanni*. The

palest specimens of the former (*chiriquensis* Bangs) are not paler than the palest of the *hoffmanni* series, and the brightest have the upper parts as red, and the tail fringe and ventral surface as deeply reddish orange, as any examples from Costa Rica. (On individual variation in this species see *antea*, p. 44.)

I also refer to *S. hoffmanni* a series of 12 specimens from the upper Cauca Valley, Colombia, showing that the form has an extended range to the southward of Costa Rica.

As stated by me five years since (this Bulletin, XII, p. 17, March 17, 1899), "true *æstuans* and *hoffmanni* should be recognized as distinct species," an opinion that seems to be shared by Mr. Bangs (*l. c.*, p. 23).

15. **Mus rattus** *Linn.* Seven specimens, Boqueron, Oct. 4, 23, and 29, and Nov. 23–30. Very abundant, with the habits of a wild species, being found remote from towns or the dwellings of man.

16. **Megadontomys flavidus** *Bangs.* Five specimens, Boquete (hence topotypes of the species), August 19–27.

17. **Peromyscus nudipes** (*Allen*).

Hesperomys (*Vesperimus ?*) *nudipes* Allen, Bull. Am. Mus. Nat. Hist., III, No. 2, 1891, p. 213. La Carpintera, Costa Rica.

Peromyscus cacabatus Bangs, Bull. Mus. Comp. Zoöl., XXXIX, No. 2, p. 29, April, 1902.

Ten specimens, Boquete, Chiriqui, Aug. 21–25, mostly young adults.

Peromyscus nudipes was described in 1891 from a single specimen, preserved in alcohol, collected by Mr. George K. Cherrie at La Carpintera, Costa Rica. Later other specimens (skins in poor condition) were received from Messrs. Cherrie and Alfaro, collected at Jimenez, Isla Nueva (Irazu Range), Santa Clara, and near San José. Recently the Museum has received a series of 19 excellent specimens, collected mostly at the Rancho de R. Jimenez, Volcan de Irazu, by M. A. Carriker, Jr., in March and April, 1902. This series is apparently indistinguishable in coloration from Mr. Batty's

specimens collected at Boquete, and hence topotypes of Mr. Bangs's *Peromyscus cacabatus*, or from the type and 4 topotypes kindly sent me for comparison by Mr. Bangs. Nine adult skulls from Irazu and vicinity (practically topotypes of *P. nudipes*) do not differ appreciably in measurements or otherwise from the 5 adult skulls of *P. cacabatus* received from Mr. Bangs, the average difference in occipito-nasal length being only .4 of a millimeter. The external measurements of 10 adults from the Irazu series compared with measurements of a similar series from Boquete, recently published by Mr. Bangs (Bull. Mus. Comp. Zoöl., XXXIX, 1902, p. 30), shows that the total length is practically the same in the two series (varying only about 1 mm.), but the Irazu specimens show a greater tail length (by about 8 mm.), and a larger hind foot (by about 2 mm.) than the Boquete specimens. This apparent difference is doubtless due to different methods of measuring, especially as respects the relative length of the tail.

18. **Tylomys watsoni** *Thomas*. One specimen, adult male, Boqueron, Oct. 31.

19. **Sigmodon borucæ chiriquensis,** subsp. nov.

Type, No. 18789, ♂ ad., Boqueron, Chiriqui, Oct. 28; J. H. Batty.

Similar to *S. borucæ*, but darker and more heavily colored, the upper parts being deep yellowish brown, varied with black instead of light yellowish brown, and the underparts strongly buffy instead of white; nose and sides of upper lip broadly ochraceous buff instead of pale buff; bullæ more pyriform and postpalatal opening much broader.

Type, total length, 280; head and body, 175; tail vertebræ, 105; hind foot (in dry skin), 32; ear, 20. An adult female is a little smaller, but has a longer tail (tail vertebræ, 115).

Represented by 6 specimens, all from Boqueron, collected Oct. 12–27.

S. b. chiriquensis closely resembles in coloration *S. toltecus saturatus* Bailey from Chiapas and Vera Cruz, Mexico, but differs from it in cranial characters. It differs from *S. borucæ* in color and cranial characters, as noted above, *borucæ* being paler with a tendency to a grayish cast on the head and anterior half of the body in slight contrast with the posterior half, while in *chiriquensis* the coloration of the upper parts is

equally intense throughout. Costa Rica specimens of *borucæ* present quite a range of variation in depth of coloration, and some of the darker specimens quite closely approach *chiriquensis*, but the well-marked differences in the form of the bullæ and the width of the postpalatal opening seem constant.

20. **Oryzomys costaricensis** *Allen.*

Oryzomys vegetus BANGS, Bull. Mus. Comp. Zoöl., XXXIX, No. 2, April, 1902, 35.

Seven specimens, Boquete (topotypes of *O. vegetus*), Aug. 19–29.

The type and 12 topotypes of *O. vegetus*, kindly sent me for examination by Mr. Bangs, do not differ appreciably from the type, 3 topotypes, and additional Costa Rica specimens of *O. costaricensis*. They also agree with the 7 Boquete specimens collected by Mr. Batty, which I unhesitatingly refer to *O. costaricensis*.

Mr. Bangs's *O. costaricensis* (*l. c.*), of which he has kindly sent me his series of 5 specimens, seems to represent merely a pale phase of *O. costaricensis*, due to individual variation. They are paler rufous above and nearly white below, but similar specimens occur in my series of 15 specimens from Costa Rica. The type of *O. vegetus* is, with one exception, the highest colored specimen of Mr. Bangs's series, but it is not very appreciably brighter than the type of *O. costaricensis*. Mr. Bangs informs me that he inadvertently placed the name *vegetus* on the dark form (= *costaricensis* vera) instead of on the light form, after having returned the specimens of *O. costaricensis* borrowed from this Museum, so that *vegetus* = *costaricensis* and the light form was left unnamed. As said above, it does not appear to be separable from true *costaricensis;* it is represented by 5 pale specimens selected from his series (= 13 '*vegetus*' + 5 '*costaricensis*'), all taken at the same locality, and some of each on the same dates.

21. **Zygodontomys cherriei** *Allen.* Eleven specimens, Boqueron, Oct. 12 and 25–31, and Nov. 20 and 25.

22. **Zygodontomys** (?), sp. One specimen, skin without skull, Boqueron, Oct. 28. Without the skull it is impossible to determine whether this specimen should be referred to *Sigmodon* or to *Zygodontomys*. In either case the species is apparently undescribed.

23. **Reithrodontomys costaricensis** *Allen*. Six specimens, Boquete, Aug. 20–29.

24. **Macrogeomys cavator** *Bangs*. Two specimens (topotypes), adult male and female, Boquete, altitude 5000 feet.

25. **Heteromys repens** *Bangs*. Two specimens, — adult female, Boqueron, Oct. 31; young in slaty pelage, Boquete, without date.

26. **Proechimys centralis chiriquinus** *Thomas*. Twelve specimens, selected from a large series, Boqueron, Oct. 21–Dec. 1.

27. **Coendou lænatus** *Thomas*. Four specimens, Boqueron, Oct. 25, Nov. 27, and Dec. 4.

28. **Dasyprocta coibæ** *Thomas*. Four specimens (topotypes), skins and skulls, and 2 additional skulls, Coiba Island, May 14–19 and June 19.

Mr. Batty has kindly given me his measurements, taken in the flesh, of 9 specimens, 3 males and 6 females; some of the latter are obviously not fully grown. The males measure respectively: Total length, 495, 555, 465; head and body, 465, 520, 435; tail, 30, 35, 30; hind foot, 120, 120, 115; ear, 40, 40, 35. The largest 3 females: Total length, 505, 510, 530[1]; head and body, 465, 470, 500; tail, 40, 40, 30; hind foot, 110, 117, 115; ear, 40, 40, 40.

29. **Lepus (Tapeti) gabbi** (*Allen*). Six specimens, including 4 adults and 2 very young examples, Boqueron, October and December, except one, taken in April, and without definite locality.

30. **Felis bangsi costaricensis** *Merriam*. One skin, without

[1] The last of these three females is the type of the species. Collector's No. 129. Mr. Thomas's measurements were taken from the skin and naturally differ from the above.

skull, an adult female, Boqueron, Jan. 6. This specimen agrees well with Dr. Merriam's description of the type, from Boquete. The sides are bright reddish fulvous; the median dorsal region is much darker — or dark reddish chestnut — as is also the dorsal area of the tail; the tail darkens apically, so that the apical half is decidedly blackish, the tip being wholly black for the terminal two inches. The inguinal region is pure white, a small pectoral area whitish, and the intervening region is like the flanks but much paler. Fur between toe pads black; ears almost wholly black, the usual lighter areas being brownish black and the rest deep black.

31. **Felis mearnsi,** nom. nov.

Felis costaricensis MEARNS, Proc. U. S. Nat. Mus., XXV, 245, Sept. 17, 1902. Talamanca, Costa Rica. Not *Felis bangsi costaricensis* Merriam, Dec. 11, 1901.

One specimen, young male, skin and skull, Boqueron, Aug. 28.

32. **Felis panamensis,** sp. nov.

Type, No. 14946, ♀ (young adult), Boqueron, Chiriqui, Panama, Oct. 30; J. H. Batty.

General color above dusky gray, the dorsal region posteriorly, tail, inner surface of limbs and feet strongly blackish; sides and front of limbs lighter, the hairs broadly tipped with whitish, giving a dark gray effect; whole head, including ears, nape, and sides of neck, much lighter than body, rusty brownish gray varied minutely with black; top of shoulders and posterior third of the median dorsal region deep black, sparsely and irregularly varied with whitish tipped hairs; tail black above, sides and undersurface lighter, strongly varied with whitish gray hairs and gray-brown underfur; general color of ventral surface dark gray, strongly blackish on the chest; fore neck and throat rusty brown, varied slightly with dusky.

Measurements. — Total length, 985; head and body, 595; tail vertebræ, 390; hind foot (in dry skin), 128; ear, 40. Skull, total length, 96; basal length of Hensel, 80; zygomatic breadth, 62; least interorbital breadth, 15.5; least postorbital breadth, 32; width of braincase, 46; length of nasals, 24; width of nasals at front border, 12; do. at end of frontals, 5.3; length of palate, 33; audital bulla, 18 x 12; breadth at posterior end of carnassials, 37; upper toothrow from front of canine, 30; length of upper carnassials, 12.5; length of lower carnassial, 9.7; length of lower jaw (front base of incisors to end of angular process), 60; height at condyle, 13; do. at coronoid, 27.

The dorsal contour of the skull is slightly and evenly convex, except that the nasals and occipital region slope abruptly downward. There is a strongly depressed sinus at the base of the nasals, as in *F. yagouaroundi*. The chief peculiarity of the dentition, aside from the small size of the teeth, is the reduction of the protocone of the upper carnassials, it being barely indicated by a slight bulging of the cingulum. In the *F. yagouaroundi* and *F. eyra* groups the protocone is strongly developed. The present skull is that of a middle-aged female, so that the general dimensions are less than would be the case in a very old skull with a highly developed occipital crest.

Felis panamensis is a member of the *yagouaroundi* group, distinguished especially by very dark coloration, the convex instead of the flat frontal region of the skull, and the practical absence of the protocone on the upper carnassial.

33. **Conepatus (Marputius) marpurito** (*Gmelin*). One specimen, male, Boqueron, Oct. 1901.

34. **Putorius (Arctogale) affinis** (*Gray*). One specimen, adult male, Boquete, altitude 5000 feet. On the right side of the head are a few white hairs, scattered singly over the whole side of the head from eye to ear; on the left is a very small oblong white spot just behind the eye, and another somewhat larger white spot in front of the lower base of the ear.

35. **Potos flavus chiriquensis,** subsp. nov.

Mr. Oldfield Thomas in his recent revision (Ann. and Mag. Nat. Hist., (7) Vol. IX, April, 1902, pp. 266–270) of the Kinkajous (*Potos flavus* group, formerly *Cercoleptes caudivolvulus*), has recognized five subspecies, adopting for one of them Martin's name *megalotus*. It is to be regretted that he did not rule out both of Martin's names, as he did one of them, as unidentifiable. Martin (P. Z. S., 1836, pp. 81–83) had two menagerie specimens, from unknown localities, which differed so much from each other that he thought they might "ultimately prove to be distinct species," and proceeded to describe them, naming them respectively *Cercoleptes megalotus* and *Cercoleptes brachyotus*. "In distinguishing between the two species of Kinkajous," he considered "it best to drop entirely

the specific title *caudivolvulus*, . . . the only mode in fact by which to avoid all possibility of confusion [!]."

Thomas says of these names (*l. c.*): "It is difficult to know how to deal with Martin's *Cercoleptes megalotus* and *brachyotus*, described from menagerie specimens without localities, . . . the characters used being mainly due, according to Gray, to the 'artifice of the preserver.' . . . In any event the name [*brachyotus*] may be put aside for the present as indeterminable." The other he adopts for a deep-colored form from "Costa Rica and Colombia," mentioning an example from Medellin, Colombia, as agreeing "best with the description," and cites others from Costa Rica, and from Valdivia and Santa Marta, Colombia, which "cannot be distinguished from it." The five subspecies he recognized may be tabulated as follows:

Potos flavus flavus. Guiana.
Potos flavus megalotus. Costa Rica and Colombia.
Potos flavus aztecus. Mexico and Guatemala.
Potos flavus modestus. Guayas Province, Western Ecuador.
Potos flavus meridensis. Sierra Nevada, Merida, Venezuela.

Nothing is said about the range of *flavus* (typica) further than to consider "Surinam" as the type locality.

This Museum contains a series of 23 specimens of Kinkajous, of which 1 (without skull) is from Merida, Venezuela (topotype of *P. f. meridensis*); 7 from Santa Marta, Colombia; 4 from Castilla Mountains, Colombia (upper Cauca region); 4 from Chiriqui, Panama; 1 from Chapada, Matto Grosso, Brazil; and 6 menagerie specimens, without localities, and hence practically worthless. Mr. Bangs has kindly loaned me 6 others — 3 from Orizaba, Mexico, and 3 from Chiriqui.

The material from these six localities — Orizaba, Chiriqui, Merida, the Castilla Mountains, Santa Marta, and Chapada — represent six well-marked forms, three of which appear to be unnamed. The Merida specimen is, of course, Thomas's *Potos flavus meridensis*. The Chiriqui specimens are very different from the Santa Marta specimens and must be separated from them; and in this connection comes up the difficult question of deciding on names for them, a matter which has

become complicated through Mr. Thomas's use of Martin's practically baseless name *megalotus* for "Costa Rica and Colombia" specimens collectively. I should discard *megalotus* as unidentifiable were it not that Thomas has habilitated it, and so under the 'first reviser' principle it may be conserved for a portion of the Costa Rica-Colombia combination. As most of his specimens were from Colombia, a Medellin example being particularly mentioned as agreeing "best with the description," and Valdivia and Santa Marta (Colombia) specimens "cannot be distinguished from it," it seems best to assign the name *megalotus* to the form of eastern Colombia; especially as my Santa Marta specimens agree far better with the description of *megalotus* than do those from Chiriqui.

The additional three forms may be recognized as follows:

Potos flavus chiriquensis, subsp. nov.

Type, No. 18926, ♂ ad., Boqueron, Chiriqui, Panama, Oct. 22, 1901; J. H. Batty.

General color (type) above brownish yellow, the hairs individually being dull brownish yellow, tipped conspicuously and quite uniformly with blackish; middle of the back rather more blackish than the sides, but without a dark dorsal line; below dull greenish yellow (without black tips to the hairs), with a darker rusty brown streak along the middle of the abdomen; sides of neck, from shoulders to cheeks, and front of neck, yellowish rufous or golden rufous; ears colored like the surrounding pelage; tail above like the back for about four fifths of its length, becoming gradually darker or brownish black apically on the terminal fifth, the sides and below dull brownish yellow.

Six other specimens differ scarcely appreciably from the type; in two there is a slight tendency to a dark dorsal line.

Measurements. — The collector's measurements are as follows:

No.	Sex.	Total length.	Head and body.	Tail vertebræ.	Hind foot.	Ear.
18926	♂ type	990	485	505	80	42
10122 [1]	♂	960	460	500	93	40
18925	♂	815	390	425	75	36
18924	♀	975	480	495	75	40
18923	♀ juv.	747	350	397	80	40

Two adult skulls, No. 18926, male (type), and No. 18924, female, measure as follows: Occipito-nasal length, ♂ 92, ♀ 90; basal length (inner base of incisors to posterior border of condyles), ♂ 83, ♀ 82;

[1] Bangs Collection.

zygomatic breadth, ♂ 59, ♀ 58.6; interorbital breadth, ♂ 21.3, ♀ 20; width of braincase, ♂ 41, ♀ 40; length of palate (incisors to end of point), ♂ 31.5, ♀ 32.5; upper premolar-molar series, ♂ 20, ♀ 20; lower premolar-molar series, ♂ 23, ♀ 22; length of lower jaw (front base of incisors to posterior border of condyle), ♂ 61, ♀ 60.5; height at condyle, ♂ 30, ♀ 29; height at coronoid process, ♂ 43.5, ♀ 44.

The dental armature is heavy; the palate is flat (not, or only slightly, depressed at posterior border); bullæ small and flat.

Compared with Santa Marta (Colombia) specimens of *P. f. megalotus*, the general coloration is much deeper and darker throughout, the yellow of a more greenish cast, especially below, the tips of the hairs of the dorsal surface black instead of reddish brown, and the narrow dark dorsal stripe, usually well-marked in the Santa Marta specimens, is absent. As regards cranial characters, the skull is considerably larger (about 4 to 6 mm. longer and proportionately wider), and the teeth are fully one third broader and larger; the most marked difference, however, is seen in the form of the posterior part of the palatal floor, which is flat in *chiriquensis* and deeply and abruptly depressed in *megalotus*, thus greatly reducing the height of the posterior narial opening and giving to it an entirely different contour; the pterygoids, on the other hand, are much deeper or broader in *megalotus*, and the pterygoid hamuli much longer and slenderer; the posterior nares are much broader and shallower, and the audital bullæ are much more inflated.

Potos f. chiriquensis differs greatly in cranial characters from all the South American forms of the genus known to me, but finds a near ally in *P. f. aztecus*.

Potos flavus caucensis, subsp. nov.

Type, No. 14186, ♂ ad., Castilla Mountains (altitude 6000 feet), upper Cauca region, Colombia, June 9, 1898; J. H. Batty.

General coloration above yellowish brown, with a reddish tinge and washed with black, with a very prominent black median stripe extending from the shoulders posteriorly to the end of the tail; the hairs of the back are individually brownish gray for their basal two thirds, then broadly ringed with brownish rusty yellow and broadly tipped with black; top of head blackish, as are also the sides and top of nose, and a prominent stripe above and below the eye, forming a broad, nearly

complete, blackish eye-ring; ears externally blackish and quite large; ventral surface pale yellow, suffused with pale brownish rufous over the fore neck, darkening to a rusty pale chestnut median band on the chest, and on the abdomen to dark chestnut; limbs externally like the sides of the body, darkening slightly on the toes; tail above like the back, that is reddish brown with a darker median band, which expands apically to occupy the whole upper surface; lower surface of tail dull brownish yellow.

The four specimens agree in their generally very dark (blackish) coloration above, but vary a little in the amount of reddish brown suffusing the surface of the dorsal pelage.

Measurements. — Type, ♂ ad., total length, 874; head and body, 430; tail vertebræ, 444; hind foot (without claws), 79; ear, 36. Another specimen, ♀ ad.: Total length, 843; head and body, 413; tail vertebræ, 430; hind foot, 73; ear, 35. The skulls of these specimens measure, respectively: Occipito-nasal length, ♂ 89, ♀ 86; basal length, ♂ 83.5, ♀ 78; zygomatic breadth, ♂ 60, ♀ 57.5; interorbital breadth, ♂ 17, ♀ 18; width of braincase, ♂ 40, ♀ 41; length of palate, ♂ 36, ♀ 36; upper premolar-molar series, ♂ 20, ♀ 20; lower premolar-molar series, ♂ 23, ♀ 22; length of lower jaw; ♂ 61, ♀ 58; height at condyle, ♂ 29.5, ♀ 27.5; height at coronoid, ♂ 41, ♀ 41.5. These specimens are both middle-aged adults.

This subspecies needs no comparison with *P. f. megalotus* (as represented by Santa Marta, Colombia, specimens), being so widely different in color; and it is equally distinct in coloration from *P. f. chiriquensis*, and radically distinct from it in cranial characters. It belongs to the group having the palatal floor posteriorly depressed, and with the teeth relatively small, and should be perhaps compared with *P. f. modestus*, from southwestern Ecuador, which it apparently approaches in coloration, but exceeds in size. It also has a general resemblance in coloration to *P. f. meridensis*, but the yellow of the lower parts is paler and much less suffused with orange, and it appears to be much larger.

Potos flavus chapadensis, subsp. nov.

Type, No. $\frac{14128}{853}$, ♂? ad., Chapada, Matto Grosso, Brazil, August, 1885; Herbert H. Smith.

Above dull yellowish brown, the tips of the hairs blackish; an indistinct and somewhat interrupted dark dorsal stripe from behind the shoulders to the rump; top of head rather darker than back, through the greater abundance of blackish-tipped hairs; ears large,

externally blackish brown, much darker than the surrounding pelage; limbs dull yellowish brown, slightly darker on the toes; tail similar in color to the back, slightly darker above toward the base and terminally, dull yellow below; ventral surface of body centrally deep ochraceous orange, lighter, clearer yellow on the sides.

Measurements. — Total length, 1123; head and body, 572; tail vertebræ, 551; hind foot (in skin), 76; ear, 45. Skull, occipito-nasal length, 92; basal length, 82; zygomatic breadth, 59; interorbital, 21; width of braincase, 39; length of palate, 37.5; upper premolar-molar series, 19; lower premolar-molar series, 20; length of lower jaw, 62; height at condyle, 28; height at coronoid, 45.5.

The palate is thinned out posteriorly, but scarcely at all depressed; teeth very small; audital bullæ large and much inflated, very much larger and much more swollen than in any of the northern forms of the genus. The specimen is old, with well-developed sagittal and occipital crests; the sex is given as "♂ ?", and is probably male.

The cranial characters separate this subspecies quite sharply from the northern forms, and the coloration is rather peculiar in the deep orange ochraceous tint of nearly the whole ventral surface, and the absence of the strong dorsal streak seen especially in *P. f. meridensis*, *modestus*, and *caucensis*, and, according to Thomas, in *flavus*.

36. **Nasua narica panamensis** *Allen.* One specimen, adult female, Boqueron, Oct. 29. Total length, 1080; head and body, 540; tail, 540; hind foot, 85.

I am indebted to Mr. Bangs for the opportunity to examine, in this connection, his series of 6 specimens from Boquete. While they agree in color with *bullata*, they lack the excessive development of the audital bullæ seen in that form, as already noted (*antea*, p. 51).

37. **Procyon lotor hernandezii** (*Wagler*). One specimen, female, Boqueron.

38. **Myotis nigricans** (*Wied*). Two specimens, Boqueron.

39. **Myotis chiriquensis,** sp. nov.

Type, No. 18736, ♀ ad., Boqueron, Chiriqui, Panama, Oct. 16, 1901; J. H. Batty. Represented by three specimens, taken at the same locality and date.

Size very small, smallest of the known American species of *Myotis;* pelage thick, soft, and rather short.

Above very dark brown; pelage beneath the surface blackish, the hairs individually very slightly tipped with gray, blending with the ground color to give a general effect of very dark brown; below basal two thirds of pelage deep plumbeous, the apical third or fourth lighter or pale brown, the ventral surface being thus decidedly paler than the dorsal; ears and membranes dark brown or blackish. Wing from base of toes; uropatagium naked above, slightly hairy at extreme base below; ears medium, rather pointed, deeply incised on the outer border.

Measurements. — Type, from dry skin: Total length, 73; head and body, 43; tail vertebræ, 30; tibia, 11.5; foot, 6.5; forearm, 26; thumb, 4; 3d finger: metacarpal, 31; 1st phalanx, 11; 2d phal., 10; 3d phal., 6.5; ear from meatus, 10; tragus, 5. Another specimen gives the same measurements, and a third is slightly larger.

Skull, total length, 13.6; mastoid breadth, 6.5.

Myotis chiriquensis is similar in coloration to *M. nigricans*, and also in the shape of the skull, from which species it is easily distinguished by its much smaller size — forearm 26 against 34 in *nigricans* from the same locality. It seems to be, in fact, a miniature of *M. nigricans*.

40. **Vespertilio fuscus miradorensis** (*H. Allen*). Three specimens, Boquete, Sept. 8 and 15.

41. **Molossus obscurus** *Geoffroy*. Six specimens: Boqueron, 2, Oct. 15 and Nov. 20; Coiba Island, 4, June 1–3.

42. **Natalus stramineus** *Gray*. One specimen. Coiba Island, June 1.

43. **Vampyrus spectrum** (*Linn.*). Two specimens, adult male and female, Boqueron, Dec. 1. Expanse, 765, 740; ear, 40, 40.

44. **Phyllostomus hastatus** (*Pallas*). Six specimens, Boqueron, Oct. 6 and 15, and Dec. 4 and 8. The measurements, given for 3 specimens only, are: Expanse, 2 males, each 650, 1 female, 630; ear, 12–12.5.

45. **Hemiderma perspicillatum** (*Linn.*). Seventeen specimens, Boqueron, Sept. 30–Oct. 6 and Nov. 11.

46. **Glossophaga soricina** (*Pallas*). Thirteen specimens, Boqueron, Sept. 30, Oct. 3, Nov. 1–19, and Dec. 1 and 16.

47. **Artibeus intermedius** *J. A. Allen.* One specimen, Boqueron, Dec. 19.

48. **Artibeus watsoni** *Thomas.* Six specimens, Boqueron, Oct. 4, Nov. 1, 13, and 18.

49. **Vampyrops helleri** *Peters.* Six specimens, Boqueron, Oct. 2, 3, 26, and 28.

50. **Desmodus rotundus** (*E. Geoffr.*). One specimen, Boqueron, Dec. 5.

51. **Alouatta palliata** (*Gray*). Seven specimens, all adult: Boqueron, 1, adult male, Dec, 2; Boquete, 6 (3 males, 3 females), Aug. 20–23. Selected from a large series.

The collector's external measurements are as follows:

Total length.	Head and body.	Tail vertebræ.	Hind foot.	Ear.
♂, 1180	550	630	150	30
♂, 1020	520	500	140	25
♂, 1095	525	570	135	30
♂, 1160	570	590	140	35
♂, 1195	565	630	155	35
♀, 1090	530	560	135	25
♀, 1075	515	560	140	35

The skull varies greatly in size with age. The oldest male, with the teeth greatly worn and the temporal ridges united to form a low sagittal crest, has a basal length (inner base of incisors to posterior border of occipital condyles) of 103 mm. and a zygomatic breadth of 91, the same measurements in a young adult being 84 and 72. The 7 skulls measure as follows:

♂,	Basal length,	103;	zygomatic breadth,	91.
♂,	" "	101;	" "	88
♂,	" "	100;	" "	86.5
♂,	" "	99;	" "	86
♂,	" "	84;	" "	72
♀,	" "	85;	" "	74
♀,	" "	85;	" "	73

The range of individual color variation is strikingly great. Two males, strictly comparable as to age (as shown by the skulls), and representing the extremes of a large series, differ as follows: One has the whole head, shoulders, lower back,

limbs, and tail deep black, with the median area of the back dull black, lighter than the head, shoulders, and limbs, and passing gradually into the lighter color of the flanks, many of the hairs at the sides of the median area being tipped with pale, glistening yellowish; flank stripe narrow, brownish yellow on the lower edge, brighter, glistening pale yellow along the middle; ventral surface dull ruddy brown, with a decidedly rufous tinge on the breast. The other also has the head, shoulders, rump, limbs, and tail deep black, but the middle region of the back is brownish black, more or less suffused with fulvous except along the median line; flank stripe, extending from front of shoulder posteriorly to thigh, deep golden rufous (in another specimen almost golden chestnut); ventral surface rusty brown.

52. **Saimiri œrstedii** (*Reinh.*) Six specimens, Boqueron, Oct. 4–Nov. 11. Three males and two females measure as follows: Total length, 687 (670–705); head and body, 295 (290–300); tail vertebræ, 392 (380–405); hind foot, 85 (76–90); ear, 25.5 (25–27).

53. **Cebus hypoleucus** (*Humboldt*). Six specimens: 5 adults, Boqueron, Oct. 9–Dec. 10; 1 young, Boquete, Sept. 20. The collector's measurements of the adults are as follows:

Total length.	Head and body.	Tail vertebræ.	Hind foot.	Ear.
♂, 880	420	460	120	35
♂, 783	343	440	130	30
♀, 820	390	430	123	35
♀, 860	405	455	120	31
♀, 840	385	455	120	30

The males and females do not appear to differ in the relative elongation or color of the hair of the frontal region.

(*Continued from 4th page of cover.*)

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. Pp. 77–132. January, 1902. Price, $1.00.

PART IV.—Shell Heaps of the Lower Frazer River. By Harlan I. Smith. Pp. 133–190, pll. vi, vii, and 59 text figures. December, 1902. Price, $1.00.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 1–270. January, 1902. Price, $3.00.

PART II.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 271–402. December, 1902. Price, $1.50.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. Pp. i–xvi, 1–332, pll. i–viii (5 colored), and 19 text figures. May, 1902. Price, $5.00.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. January, 1902. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. i–xxviii. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.

Volume I, 1881–86.....	Price, $5.00	Volume XI, Part III, 1900,	Price, $2.00
" II, 1887–90.....	" 4.75	" " " IV, 1901	" 1.75
" III, 1890–91.....	" 4.00	" " (Complete)...	" 5.00
" IV, 1892.....	" 4.00	" XII, 1899.....	" 4.00
" V, 1893.....	" 4.00	" XIII, 1900.....	" 4.00
" VI, 1894.....	" 4.00	" XIV, 1900.....	" 4.00
" VII, 1895.....	" 4.00	" XV, Part I, 1901..	" 3.00
" VIII, 1896.....	" 4.00	" XVI, 1902.....	" 5.00
" IX, 1897.....	" 4.75	" XVII, Part I, 1902..	" 1.50
" X, 1898.....	" 4.75	" " " II, "	" .75
" XI, Part I, 1898	" 1.25	" XVIII, " I, "	" 2.00
" " " II, 1899	" 2.00	" XIX, 1903.....	" 6.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued quarterly. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of from about 400 to 700 pages, and from about 25 to 60 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I.

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the Report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

PART VIII.—The Reptilian Subclasses Diapsida and Synapsida and the Early History of the Diaptosauria. By Henry Fairfield Osborn. Pp. 449–507, pl. xl, and 28 text figures. (With Contents and Index to Volume I.) November, 1903. Price, 2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

PART II.—The Basketry of the Tlingit. Pp. 229–277, pll. v–xviii, and 73 text figures. July, 1903. Price, $2.00.

(*Continued on 3d page of cover.*)

[*Reprinted from* SCIENCE, *N. S., Vol. XIX., No. 482, Pages 498–501, March 25, 1904.*]

PALMER'S 'INDEX GENERUM MAMMALIUM.'*

DR. PALMER'S 'Index Generum Mammalium' is a work of immense labor, painstakingly and intelligently performed, and its publication will form a landmark in the history of mammalian nomenclature. It furnishes not only an elaborately annotated list of all the generic and family names of mammals, recent and extinct, published since the beginning of the binomial system of Linnæus down to the end of the year 1903, but the introduction, besides disclosing the origin, history and scope of the work, furnishes a fund of historic information that should most favorably influence the methods of the future in the bestowal and use of names by systematists, not only in mammalogy but in other departments of natural history.

The work consists of an 'introduction' of about 70 pages, followed by Parts I.–III., with an appendix, and an index to Part III. Part I. comprises 'Index of Genera and Subgenera' (pp. 71–717); Part II., includes the 'Family and Subfamily Names of Mammals' (pp. 719–776); while Part III. is an 'Index of Genera Arranged According to Orders and Families' (pp. 777–948). The appendix contains names discovered too late to insert in their proper places in Part I. and various additions and

* 'Index Generum Mammalium: A List of the Genera and Families of Mammals.' By T. S. Palmer, Assistant, Biological Survey. Prepared under the direction of Dr. C. Hart Merriam, Chief of Division of Biological Survey. North America Fauna No. 23, U. S. Department of Agriculture, Division of Biological Survey. Washington, Government Printing Office, 1904. (January 23, 1904.) 8vo, pp. 984.

corrections, by means of which 'the index is brought down to January 1, 1904.'

In the 'introduction' (pp. 8–69) there is first a statement of the history and purpose of the work. From this it appears that the work was begun by Dr. C. Hart Merriam about 1884, and was taken in hand by Dr. Palmer in 1889, who continued it, aided by competent assistants, till its completion in 1903, it being carried on in connection with the systematic work on mammals conducted by the Biological Survey. Under 'acknowledgments' special mention is made of the careful and painstaking work of Miss Thora Steineger, who spent much time in several of the leading libraries of Europe in verifying references, besides rendering important clerical assistance in Washington throughout the progress of the work. Especial thanks, on behalf of the users of the index as well as the author, are also rendered to Mr. F. H. Waterhouse, librarian of the Zoological Society of London, who, on learning of Dr. Palmer's work, generously placed in his hands a large amount of manuscript he had already prepared for a similar undertaking.

The introduction treats in much detail all the principal questions, moot and otherwise, that relate to nomenclatural usage. Under 'References and Dates' is considered the important question of what constitutes publication, and the necessity of determining, and respecting, actual dates of publication, which are often difficult to ascertain. In this connection is presented a useful list of special papers giving dates of publication for works issued in parts, and dates of the parts of the 'Proceedings' of a number of scientific societies and museums. Under 'Authorities and Localities,' and 'Types and their Determination,' are treated important questions of usage about which authorities often differ, as the determination of types of genera, etc., apropos of the author's methods in the present

work. A list of 'Hypothetical Genera' is accompanied by pertinent comment; 'Changes in Form of Names' covers a consideration of the much-vexed question of the proper treatment of 'emended' names. On this point the author says: "Probably no section of the A. O. U. Code has been the subject of so much criticism as Canon XL., which provides that 'the original orthography of a name is to be rigidly preserved, unless a typographical error is evident.' Stability and priority are two of the cardinal principles of the code, but priority is merely a means of securing stability, and applies as well to the adoption of the earliest name as to the earliest form of that name. Experience has shown that any other course leaves the door wide open to emendation and resultant confusion." A number of generic names are cited, having from five to eight variants that have been more or less in use, in illustration of the results of emendation; and in further elucidation of the extent to which emendation may be carried, it is shown that the name *Aplodontia,* with eight actual variants, 'is capable of at least twenty-four modifications, each one differing from the rest by a single letter.' Some eminent zoologists maintain that a difference of a single letter in two names is sufficient to distinguish them, and to prevent the later name or names (for there are often several) from being thrown out as preoccupied, whether the difference in form is due to gender, to a difference in the connecting vowel in compound words, or to the presence or absence of aspirates; while others consider names the same when having the same etymological origin, though differing in form.

Under 'Rejection of Names' the author considers at length the following topics: 'Preoccupied names,' under which is given a most useful 'List of Homonyms within the Class Mammalia; and another list of preoccupied names in mammalogy and ornithology; 'nom-

ina nuda,' French common names of Latin derivation, 'plural subgeneric names,' etc.

Pages 41–46 are devoted to the 'Etymology of Names,' under which are considered classical names, barbarous names, 'nonsense names' ('coined' names and anagrams), mythological names, geographical names, personal names, compounds and double generic names. These pages contain an immense amount of information, both historic and etymological, in reference to the sources and relative prevalence of these different classes of names, illustrated by tabular expositions, which are not only of high interest but of much practical utility, but which it is impossible here to particularize. The section devoted to 'Application of Names' (pp. 60–67) also abounds in interesting and practical information.

In Part I., 'Index of Genera and Subgenera,' the names stand in alphabetic sequence, and under each are given from half a dozen to a dozen distinct and important items of information, as follows: Author and date; the order and family to which it is referred; the place of its original publication; its variants, if any, and by whom, when and where published; its type if specified, and if no type was given by the author, and none has been since 'fixed,' a list of the species originally included under it; the locality whence, and the place where the type was described, and, if an extinct species, the character of the type specimen, and its geological formation and locality; its etymology and significance, or, in the case of a barbarous name, its original source and use. If the name be antedated or preoccupied, these facts are duly noted; and where the same name has been proposed for different genera of mammals, its several uses are given chronologically. In this way the history and status of each name is fully set forth, so that its availability or non-availability is easily determined. In

no other work has such fulness of treatment been given, nor is it easy to see where anything essential to the history of a name has been omitted. As the 'index' includes upward of 4,500 names, the immense amount of labor involved in its preparation is evident, while no similar work is to be compared with it in fulness of detail and consequent usefulness. Of these 4,500 names, it is stated that over 400, or 10 per cent., prove to be preoccupied, and of these latter 'about 150, or nearly 40 per cent., are homonyms in the class Mammalia' (p. 953).

In Part II., 'Family and Subfamily Names,' the treatment is necessarily different, in accordance with the requirements of the case. Here the name, author, date and the order to which it is referred are stated, followed by a reference to the place of first use, with secondary references to its variants, if any, and modified uses as regards the rank of the group. The arrangement is, of course, alphabetic, and the index proper is preceded by several pages giving the history of the origin and use of such names, particularly in reference to the final adoption of the terminations *idæ* and *inæ*, indicating respectively families and subfamilies. There is also a summary of the rules that have been proposed by different nomenclatural codes in relation to these groups, and illustrations of the difficulty of applying these rules.

Part III., 'Index of Genera Arranged According to Orders and Families,' has been prepared to show 'what names have been used in a certain group, why a name is unavailable, or whether any published name is available for one which is preoccupied.' The arrangement is here alphabetic, first as regards orders, and secondly as respects the families, subfamilies and genera, within the orders. The classification adopted is that of Flower and Lydekker in 'Mammals, Living and Extinct' (1891),

with modifications; the nomenclature, however, is often different. 'The name of the class Mammalia,' says the author, 'is one of the few names concerning which there is universal agreement.' After illustrating how modern authorities differ in respect to the names of even the primary divisions of the class, the author gives an outline of the classification and nomenclature here adopted, and an explanation of his system of cross references designed to facilitate the finding of any desired name.

This part of the work is especially important, and amounts to, practically, a revision of the nomenclature of the Mammalia, recent and extinct. In respect to family names, the name based on the earliest generic name has been adopted when available, as when the genus on which it is based is not antedated or preoccupied. Under the family name are cited (1) its synonyms and subfamilies, (2) its genera, with the author, date and type species of each. Recent genera are distinguished from extinct genera by the use of black-faced type for the former and italic for the latter; preoccupied names have a dagger (†) prefixed, but names otherwise untenable appear not to be designated, except as shown by the context.

The appendix adds 35 names discovered too late to be included in Part I. These include a few from Frisch (1775) and a considerable number from Billberg (1828), and others proposed during 1903. These early names are fortunately merely *nomina nuda,* or synonyms, or otherwise untenable. The appendix also includes several pages of corrections, some of them important, affecting the authorities for a few genera given in Part I., and in one case the orthography of a name, *Tayassu* G. Fischer (1814) becoming *Tagassu* Frisch (1775), with a corresponding change in the family name based on this genus.

It can not be supposed that a work of this

character can be entirely free of errors, but with the great care taken in the preparation of the manuscript (see p. 11) they are doubtless reduced as nearly to a minimum as can reasonably be expected. The work embodies the results of a vast amount of labor, for which mammalogists can not be too grateful; it has set a high standard for future workers in the same line to emulate; and has placed in the hands of experts in nomenclature an invaluable aid in their work. J. A. A.

The External Ear Bone in Certain Rodents.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XX, Article IX, pp. 135–138.

New York, April 7, 1904.

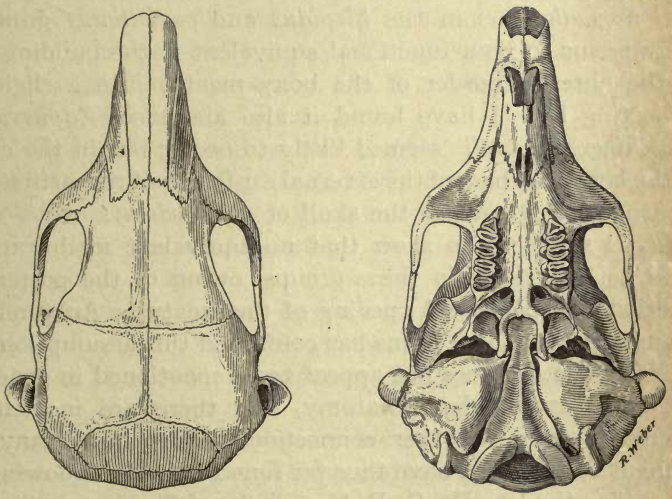
The Knickerbocker Press, New York

Article IX. — THE EXTERNAL EAR BONE IN CERTAIN RODENTS.

By J. A. Allen.

My attention was recently called by my assistant, Mr. F. A. Schneider, to a skull of *Liomys canus* Merriam which showed a singular bony appendage attached by a ligamentous hinge to the front lower border of the left meatus auditorius, it having attracted his notice, in cleaning the skull, as something out of the ordinary. As he had several other skulls of this species to prepare, I urged him to take great care to save this appendage in situ. As a result he found it on one or both sides of several of the remaining skulls, including the one here figured.

This external ear bone is situated at the front lower border of the meatus and is hinged to it by ligament; it has the



Skull of *Liomys canus* Merriam, showing external ear bones. No. 20995, Am. Mus. Nat. Hist., ♂ ad. Twice nat. size.

form of a truncated oval or crescentic appendage, quite large and prominent, as shown in the accompanying figures. Although hinged and moveable, the range of movement is from

the vertical forward; it cannot be pressed backward to close the meatus without breaking the ligamentous hinge, but can readily be flexed forward through a wide angle. Its function therefore seems to be to prevent the closing or partial closing of the meatus by the soft parts of the ear. The external ear is not large, in this group, for the size of the animal, as is the case in Chinchilla, where it also exists, so that this appendage is not necessarily correlated with a large external ear, nor even with greatly developed audital bullæ. This bone is of very dense structure, and is evidently developed from an independent center of ossification.

On examination of alcoholic specimens of *Liomys bulleri* (Thomas), *Heteromys anomalus* (Thompson), and *Heteromys jesupi* Allen, I find this appendage to be well developed in each of these species, as it doubtless is in all the members of the *Heteromys* (including *Liomys*) group. But I could find no trace of it in the only species of *Perognathus* of which alcoholics are available for examination. In the larger species of *Perognathus*, as in the *hispidus* and *penicillatus* groups, there seems to be a functional equivalent in the building up of the anterior border of the bony meatus into a slightly projecting lip. I have found it also absent in *Zapus* and *Proechimys*, where it seemed likely to occur; but in the case of the latter the base of the external ear forms a firm cartilaginous tube. A glance at the skull of a *Dipodomys* or a *Perodipus* is sufficient to show that no equivalent modification need be looked for in these groups, owing to the posterior position and backward opening of the meatus. Anatomical examination of these forms has confirmed this assumption.

This structure does not appear to be mentioned in general works on mammalian anatomy, but there are incidental references to it in other connections — just how many is difficult to trace. I have thus far found only the following:

In 1890 the late Dr. G. E. Manigault, of Charleston, South Carolina, reported (Proc. Elliott Soc. Nat. Hist., May, 1890, pp. 237–239) the discovery of a "crescent-shaped flat bone occupying the anterior half of the outer edge of the external meatus of the ear," in *Chinchilla lanigera*, and gave figures

of it. He being unable to find any published account of such a structure, either in the Chinchilla or other mammals, wrote to various leading mammalogists and comparative anatomists on the subject but succeeded in obtaining no very definite information. Mr. G. B. Howes of London, in reply to his inquiries, stated that he was familiar with it, and "with its like in other Hystricomorpha. There are two such in *Cavia*, and I believe them to be ossifications of the cartilaginous meatus externus." Mr. Howes further stated that he knew of no published description of this bone. Mr. Oldfield Thomas, in replying also to Dr. Manigault's inquiries, said: "Like him (Mr. Howes) I have seen the extra ear bone myself, but cannot remember where there is a description of it. I have, however, a strong impression that I have seen it described somewhere, but by whom, and in what particular animal I cannot recall."

I had likewise searched carefully for some published account of this interesting feature, but had been able to find only that given by Dr. Manigault, as cited above, until my attention was called by Prof. W. B. Scott, the eminent palæontologist, to a paper by Dr. W. Peters on the genus *Pectinator*, wherein it is mentioned.

Dr. Peters, in describing the skull of *Pectinator* (Trans. Zoöl. Soc. London, VII, Pt. V, 1871, p. 401) states: "The tympanic bullæ are also comparatively larger than in *Ctenodactylus;* but the meatus auditorius externus has the same direction, and is in the same manner elongated by an inferior semiannular osseus appendage, as in *Ctenodactylus*." Dr. Peters's figure of this appendage (*l. c.*, pl. 49, fig. 3) shows that it closely resembles, in size and form, the same structure in *Heteromys*.

Mr. Wm. Yarrell, many years before, gave an account of the anatomy of *Ctenodactylus massonii* Gray (P. Z. S., 1831, p. 44), in which he says: "The *meatus auditorius* is elongated, forming a tube 2-10ths of an inch in length on the inferior surface and lined with a dense pigment." But he says nothing of this elongation being produced by the development of a separate ossicle

the vertical forward; it cannot be pressed backward to close the meatus without breaking the ligamentous hinge, but can readily be flexed forward through a wide angle. Its function therefore seems to be to prevent the closing or partial closing of the meatus by the soft parts of the ear. The external ear is not large, in this group, for the size of the animal, as is the case in Chinchilla, where it also exists, so that this appendage is not necessarily correlated with a large external ear, nor even with greatly developed audital bullæ. This bone is of very dense structure, and is evidently developed from an independent center of ossification.

On examination of alcoholic specimens of *Liomys bulleri* (Thomas), *Heteromys anomalus* (Thompson), and *Heteromys jesupi* Allen, I find this appendage to be well developed in each of these species, as it doubtless is in all the members of the *Heteromys* (including *Liomys*) group. But I could find no trace of it in the only species of *Perognathus* of which alcoholics are available for examination. In the larger species of *Perognathus*, as in the *hispidus* and *penicillatus* groups, there seems to be a functional equivalent in the building up of the anterior border of the bony meatus into a slightly projecting lip. I have found it also absent in *Zapus* and *Proechimys*, where it seemed likely to occur; but in the case of the latter the base of the external ear forms a firm cartilaginous tube. A glance at the skull of a *Dipodomys* or a *Perodipus* is sufficient to show that no equivalent modification need be looked for in these groups, owing to the posterior position and backward opening of the meatus. Anatomical examination of these forms has confirmed this assumption.

This structure does not appear to be mentioned in general works on mammalian anatomy, but there are incidental references to it in other connections — just how many is difficult to trace. I have thus far found only the following:

In 1890 the late Dr. G. E. Manigault, of Charleston, South Carolina, reported (Proc. Elliott Soc. Nat. Hist., May, 1890, pp. 237–239) the discovery of a "crescent-shaped flat bone occupying the anterior half of the outer edge of the external meatus of the ear," in *Chinchilla lanigera*, and gave figures

of it. He being unable to find any published account of such a structure, either in the Chinchilla or other mammals, wrote to various leading mammalogists and comparative anatomists on the subject but succeeded in obtaining no very definite information. Mr. G. B. Howes of London, in reply to his inquiries, stated that he was familiar with it, and "with its like in other Hystricomorpha. There are two such in *Cavia*, and I believe them to be ossifications of the cartilaginous meatus externus." Mr. Howes further stated that he knew of no published description of this bone. Mr. Oldfield Thomas, in replying also to Dr. Manigault's inquiries, said: "Like him (Mr. Howes) I have seen the extra ear bone myself, but cannot remember where there is a description of it. I have, however, a strong impression that I have seen it described somewhere, but by whom, and in what particular animal I cannot recall."

I had likewise searched carefully for some published account of this interesting feature, but had been able to find only that given by Dr. Manigault, as cited above, until my attention was called by Prof. W. B. Scott, the eminent palæontologist, to a paper by Dr. W. Peters on the genus *Pectinator*, wherein it is mentioned.

Dr. Peters, in describing the skull of *Pectinator* (Trans. Zoöl. Soc. London, VII, Pt. V, 1871, p. 401) states: "The tympanic bullæ are also comparatively larger than in *Ctenodactylus;* but the meatus auditorius externus has the same direction, and is in the same manner elongated by an inferior semiannular osseus appendage, as in *Ctenodactylus*." Dr. Peters's figure of this appendage (*l. c.*, pl. 49, fig. 3) shows that it closely resembles, in size and form, the same structure in *Heteromys*.

Mr. Wm. Yarrell, many years before, gave an account of the anatomy of *Ctenodactylus massonii* Gray (P. Z. S., 1831, p. 44), in which he says: "The *meatus auditorius* is elongated, forming a tube 2-10ths of an inch in length on the inferior surface and lined with a dense pigment." But he says nothing of this elongation being produced by the development of a separate ossicle

Doubtless other cases are on record, but those above cited indicate that this structure occurs in several widely separated groups of Rodents.

In species in which this structure exists, it is not likely to be met with attached to the skull in Museum specimens, since, owing to its nature and position, it would naturally be removed or mutilated by the collector in taking off the skin, attached to which it may doubtless be occasionally detected by careful examination.

(*Continued from 4th page of cover.*)

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. Pp. 77–132. January, 1902. Price, $1.00.

PART IV.—Shell Heaps of the Lower Frazer River. By Harlan I. Smith. Pp. 133–190, pll. vi, vii, and 59 text figures. December, 1902. Price, $1.00.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 1–270. January, 1902. Price, $3.00.

PART II.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 271–402. December, 1902. Price, $1.50.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. Pp. i–xvi, 1–332, pll. i–viii (5 colored), and 19 text figures. May, 1902. Price, $5.00.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. January, 1902. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. i–xxviii. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.

Volume I, 1881–86.....	Price, $5.00	Volume XI, Part III, 1900,	Price, $2.00
" II, 1887–90.....	" 4.75	" " " IV, 1901	" 1.75
" III, 1890–91.....	" 4.00	" " (Complete)...	" 5.00
" IV, 1892.....	" 4.00	" XII, 1899.....	" 4.00
" V, 1893.....	" 4.00	" XIII, 1900.....	" 4.00
" VI, 1894.....	" 4.00	" XIV, 1900.....	" 4.00
" VII, 1895.....	" 4.00	" XV, Part I, 1901..	" 3.00
" VIII, 1896.....	" 4.00	" XVI, 1902.....	" 5.00
" IX, 1897.....	" 4.75	" XVII, Part I, 1902..	" 1.50
" X, 1898.....	" 4.75	" " " II, "	" .75
" XI, Part I, 1898	" 1.25	" XVIII, " I, "	" 2.00
" " " II, 1899	" 2.00	" XIX, 1903.....	" 6.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued quarterly. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of from about 400 to 700 pages, and from about 25 to 60 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I.

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the Report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xiia–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

PART VIII.—The Reptilian Subclasses Diapsida and Synapsida and the Early History of the Diaptosauria. By Henry Fairfield Osborn. Pp. 449–507, pl. xl, and 28 text figures. (With Contents and Index to Volume I.) November, 1903. Price, 2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

PART II.—The Basketry of the Tlingit. Pp. 229–277, pll. v–xviii, and 73 text figures. July, 1903. Price, $2.00.

(*Continued on 3d page of cover.*)

12

Further Notes on Mammals from Northwestern Durango.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XX, Article XVII, pp. 205–210.

New York, May 28, 1904.

LIBRARY OF THE UNIVERSITY OF CALIFORNIA

The Knickerbocker Press, New York

Article XVII. — FURTHER NOTES ON MAMMALS FROM NORTHWESTERN DURANGO.

By J. A. Allen.

Since my previous report on mammals collected by Mr. J. H. Batty in northwestern Durango (see this Bulletin, XIX, 1903, pp. 590–612), additional specimens have been received from him, from the same general region, representing additional localities and six additional species. The later shipments raise the total number of specimens received from this limited area (*cf.* l. c., pp. 590, 591) to about 660, and the number of species to 40. Considering the comparatively small area traversed, and the arid nature of the country, this large number of species indicates a quite varied fauna, and shows that Mr. Batty made a thorough exploration of this small tract of country, limited to the Sierra Madre and adjoining plains to the eastward.

The new localities represented by the present material are San Andres, Guanacevi, La Cienega, Cienega Corrales, and La Boca, ranging in altitude from 3000 to 8000 feet. The species additional to the previous list are indicated by an asterisk prefixed to the name.

1. **Odocoileus battyi** *Allen.*—Four specimens, skins and skulls, and 2 additional skulls, Guanacevi, September.

2. **Sciurus apache** *Allen.* — Three specimens, collected as follows: San Andres (alt. 3000 ft.), 1, Oct. 15; Cienega Corrales (alt. 7000 ft.), 2, Nov. 9 and 11. These are much darker than May specimens, with the fulvous of the underparts deeper, and the tail fringed with deep fulvous instead of pale fulvous or yellowish white, as in late May specimens from the same general locality.

* 3. **Sciurus aberti phæurus,** subsp. nov.

Type, No. 23821, ♀ ad., La Cienega (alt. 7500 ft.), northwestern Durango, Mexico, Nov. 4, 1903; coll. J. H. Batty.

Similar to *S. aberti durangi*, but with the back gray, faintly suffused

with reddish, chiefly below the surface and only slightly visible, instead of dark rufous or reddish chestnut along the back from shoulders to rump, as in typical *durangi;* sides of nose (to eyes) gray, in some specimens faintly tinged with pale buff, not "dingy gray suffused with brownish but usually reddish brown," as in *durangi;* eyering soiled white; base of ears externally pale reddish brown; a prominent black lateral line; tail gray above and below, more finely grizzled below, broadly fringed with white, exactly as in *durangi.*

Measurements.—Type: Total length, 493 mm.; head and body, 271; tail vertebræ, 222; hind foot, 69. A series of 11 adults measure: Total length, 477 (453–508); tail vertebræ, 216 (203–229). These measurements are considerably below those given for *S. durangi* by Mr. Nelson (Proc. Washington Acad. Sci., I, 1899, p. 86).

This subspecies is based on 12 specimens collected at La Cienega (alt. 7000 ft.) and Cienega Corrales (alt. 7000 ft.), Nov. 1–13, and hence in fall pelage, with the ear-tufts only slightly developed. The series is very uniform in coloration. The faint reddish suffusion of the back is mostly hidden below the surface, giving the effect of dull gray with a faint reddish cast, scarcely noticeable except on close inspection. A single specimen forms an exception, having the whole middorsal region strongly reddish, but much less red than typical *durangi.*

Sciurus aberti phœurus differs from *S. aberti durangi* mainly in the absence of the reddish brown dorsal area and in smaller size. As regards coloration, it is almost the exact counterpart of *S. aberti ferreus* of True (described originally as *S. a. concolor*) from northeastern Colorado, the most distant point from Durango in the range of the *Sciurus aberti* group.

Since writing the above I have had an opportunity, through the kindness of Dr. C. Hart Merriam, Chief of the Biological Survey, to examine the fine series of *Sciurus durangi* collected by Messrs. E. W. Nelson and E. A. Goldman, comprising a series of 24 specimens, all practically topotypes of the species. These are all red-backed, in striking contrast with the form here named *phœurus.* Seven specimens in the same collection from Guadalupe y Calvo, Sonora, are variously intermediate between *aberti, durangi,* and *phœurus;* three of them are dis-

tinctly intermediate between *durangi* and *aberti*, being similar to *aberti* but with much less white in the tail; two others closely approach *phœurus*, having the back gray and the tail as in *durangi;* the other two are fairly intermediate between *durangi* and *phœurus*.

An allied and apparently rather unstable form occurs at Colonia Garcia, in northwestern Chihuahua, and may be thus described:

Sciurus aberti barberi, subsp. nov.

Type, No. 17503, Am. Mus. Nat. Hist., ♀ ad., Colonia Garcia, Chihuahua, Oct. 14, 1901; coll. C. M. Barber, for whom the subspecies is named.

Similar to *S. a. phœurus*, except that the lower surface of the tail is white instead of finely grizzled gray, as in *durangi* and *phœurus*.

Fall pelage. — Sides of nose and eyering soiled white; general color above clear gray, with a subapical pale fulvous suffusion not usually visible except on parting the hairs; a broad black lateral line; ventral surface white; upper surface of fore and hind feet white; tail above mixed black and white, very broadly fringed with white, and white below, except at extreme base, as in *S. aberti;* ears nearly naked, slightly rufous at base outside, with the black ear-tufts about half grown.

Measurements.—Type: Total length, 500 mm.; tail vertebræ, 240; hind foot, 70. Six adult specimens, all from the type locality, measure: Total length, 507 (500–516); tail vertebræ, 237 (220–250); hind foot, 71.9 (70–72).

In the worn summer pelage (May 26–June 18) the gray of the upper parts is duller and more dingy, and the feet are gray instead of white; two specimens out of five show slight traces of red along the middle of the back.

This form is closely related to true *aberti*, it considerably exceeding in size either *durangi* or *phœurus*, from both of which it differs in having the under surface of the tail heavily washed with white, so that the gray basal portion of the hairs is thinly overlaid by white, while in *aberti* the hairs of the lower surface of the tail present a solid mass of white, the hairs of the whole lower surface being pure white to the base.

The above description was originlly based on a series of 7 specimens with wholly gray backs, or with only a slight

suffusion of reddish brown, they agreeing in this respect with typical *phœurus*, but the lower surface of the tail is lightly washed with white instead of being wholly grizzled gray. I have since had the pleasure of examining a series of 22 specimens in the collection of the Biological Survey, from Colonia Garcia and vicinity, of which about half have the dorsal region gray, while most of the others have the reddish brown dorsal area common to true *S. aberti* and *S. aberti durangi;* all, however, have the under surface of the tail superficially white — not solidly white as in true *aberti.* The red-backed specimens are strikingly similar to the Sonoran red-backed Guadalupe y Calvo specimens noted above under *S. a. phœurus* as intergrades between *S. aberti* and *S. a. durangi*, and perhaps they should be considered as intergrades between the form here described as *barberi* and *aberti.* The color of the feet varies with season in probably all the forms of the *aberti* group, being gray in summer and white in winter, but the amount of white on the feet is to some extent correlated with the color of the under surface of the tail.

Sciurus aberti forms a curiously variable group, with somewhat parallel lines of variation in widely separated localities, the intermediate regions being occupied by other and very different forms, as illustrated by the distribution of *S. a. ferreus* and *S. a. phœurus*, in comparison with that of true *aberti.*

* 4. **Eutamias canescens,** sp. nov.

Type, No. 23852, Am. Mus. Nat. Hist., ♀ ad., Guanacevi (alt. 8000 ft.), Durango, Mexico, Oct. 12, 1903; coll. J. H. Batty.

Similar in general appearance to *E. dorsalis*, but with the dorsal stripes much more strongly defined. General color above gray, suffused with fulvous, the tips of the hairs being whitish with a subapical zone of yellowish, which more or less tinges the surface; median dorsal stripe narrow, deep black, extending from middle of crown to base of tail; the two lateral dark dorsal stripes short, mixed fulvous, gray and black, the black sometimes predominating but usually obscured by the gray and fulvous; inner pair of light stripes ashy gray, the outer lighter, whitish gray; sides pale rusty fulvous, much brighter than in *E. dorsalis;* tail as in *dorsalis*,—above mixed gray and black, sides fringed with whitish gray, lower surface with the central area and

anal region deep orange rufous; head stripes and ears as in *dorsalis* but the dark stripes are stronger, the white stripes clearer white, and the post-auricular white patch larger and more conspicuous.

Measurements.—Type: Total length, 254 mm.; head and body, 140; tail vertebræ, 114; hind foot, 35; ear from crown, 16; ear from notch, 19.5. *Skull*, total length, 38; zygomatic breadth, 20. Three other specimens have practically the same measurements as the type, and two others (young adults) are somewhat smaller.

Based on 9 specimens, all collected at Guanacevi, Oct. 8–17.

Eutamias canescens belongs distinctly to the *E. dorsalis* group, but differs from true *dorsalis* in the greater distinctness of the dorsal stripes and the deeper fulvous of the sides. Two specimens from Colonia Garcia, Chihuahua, collected Oct. 12, and thus strictly comparable as to season, closely agree with the Durango series. This is apparently the first record of the *E. dorsalis* group in Mexico. Two very distinct species of *Eutamias* — *durangæ* and *canescens* — thus occur in the mountain ranges of northwestern Durango.

5. **Citellus grammurus rupestris** *Allen.* Nine specimens, 6 adult and 3 young, Guanacevi, Oct. 8–17. Two of the adults are still partly in the discolored, greatly worn pelage of summer; the other four adults have moulted into fall pelage. The young are less than one quarter grown, showing that the young are sometimes born as late as the latter part of September. As the April and May series contained no young, and no females that were nursing young when killed, the breeding season does not begin apparently till June and continues till late in September.

* 6. **Citellus spilosoma** (*Bennett*). Three specimens, an adult female and two young in first pelage, Rio Ocampo, June 30.

7. **Mus alexandrinus** *Geoffroy.* Two specimens, San Andres, Oct. 15.

8. **Mus musculus** *Linn.* Two specimens, Guanacevi, Oct. 19.

9. **Sigmodon minimus** *Mearns.* One specimen, Guanacevi, Oct. 12.

10. **Sigmodon baileyi** *Allen.* One specimen, Guanacevi, Sept. 21.

11. **Thomomys sinaloæ** *Merriam.* One specimen, La Boca (alt. 8000 ft.), Oct. 15.

12. **Lepus gaillardi battyi** *Allen.* Three adults and one young in first pelage, Rio Ocampo, June 29 and 30.

13. **Lepus arizonæ major** *Mearns.* Three specimens — one young in first pelage, Rio Ocampo, June 30; two adults, Guanacevi, Oct. 6 and 13.

Mr. E. W. Nelson has kindly called my attention to the fact that my *Lepus durangæ* (this Bulletin, XIX, 1904, p. 609) is the same as *Lepus holtzneri* Mearns, a species I entirely overlooked when describing *L. durangæ.*

* 14. **Urocyon cineroargenteus scotti** (*Mearns*). Two specimens, Rosario, Jan. 21; Rio Ocampo, June.

* 15. **Ursus americanus** *Pallas.* One specimen, skull only, Rio Ocampo.

16. **Myotis californicus durangæ** *Allen.* One specimen, Rio Ocampo, June.

17. **Antrozous pallidus** (*Leconte*). One specimen, Rio Ocampo, June.

(*Continued from 4th page of cover.*)

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. Pp. 77–132. January, 1902. Price, $1.00.

PART IV.—Shell Heaps of the Lower Frazer River. By Harlan I. Smith. Pp. 133–190, pll. vi, vii, and 59 text figures. December, 1902. Price, $1.00.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 1–270. January, 1902. Price, $3.00.

PART II.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 271–402. December, 1902. Price, $1.50.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. Pp. i–xvi, 1–332, pll. i–viii (5 colored), and 19 text figures. May, 1902. Price, $5.00.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. January, 1902. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. i–xxviii. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.

Volume I, 1881–86.....	Price, $5.00	Volume XI, Part III, 1900,	Price, $2.00
" II, 1887–90.....	" 4.75	" " " IV, 1901	" 1.75
" III, 1890–91.....	" 4.00	" " (Complete)...	" 5.00
" IV, 1892.....	" 4.00	" XII, 1899.....	" 4.00
" V, 1893.....	" 4.00	" XIII, 1900.....	" 4.00
" VI, 1894.....	" 4.00	" XIV, 1900.....	" 4.00
" VII, 1895.....	" 4.00	" XV, Part I, 1901..	" 3.00
" VIII, 1896.....	" 4.00	" XVI, 1902.....	" 5.00
" IX, 1897.....	" 4.75	" XVII, Part I, 1902..	" 1.50
" X, 1898.....	" 4.75	" " " II, "	" .75
" XI, Part I, 1898	" 1.25	" XVIII, " I, "	" 2.00
" " " II, 1899	" 2.00	" XIX, 1903.....	" 6.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued quarterly. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of from about 400 to 700 pages, and from about 25 to 60 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I.

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the Report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

PART VIII.—The Reptilian Subclasses Diapsida and Synapsida and the Early History of the Diaptosauria. By Henry Fairfield Osborn. Pp. 449–507, pl. xl, and 28 text figures. (With Contents and Index to Volume I.) November, 1003. Price, 2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

PART II.—The Basketry of the Tlingit. Pp. 229–277, pll. v–xviii, and 73 text figures. July, 1903. Price, $2.00.

(*Continued on 3d page of cover.*)

New Bats from Tropical America, with Note on Species of Otopterus.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XX, Article XX, pp. 227–237.

New York, June 29, 1904.

The Knickerbocker Press, New York

Article XX.—NEW BATS FROM TROPICAL AMERICA, WITH NOTE ON SPECIES OF OTOPTERUS.

By J. A. Allen.

During the last three or four years the Museum has received many bats from Central America, northern South America, and the West Indies, aggregating about 600 specimens, but pressure of other work has delayed until now any serious attempt at their identification. On working up this large amount of material it is not surprising to find that it contains a few hitherto undescribed forms.

In this connection I wish to express my great indebtedness to Mr. Gerrit S. Miller, Jr., Assistant Curator of the Division of Mammalogy, U. S. National Museum, whose great familiarity with the American Chiroptera is well known, for valued assistance in determining many of the forms, and for placing at my disposal the large collection under his charge.

About 200 specimens, representing most of our undetermined species, were taken recently to Washington for direct comparison with the identified material of the National Museum.

Molossus coibensis, sp. nov.

Type, No. 18731, ♂ ad., Coiba Island, Republic of Panama, June 3, 1901; J. H. Batty.

Much smaller and much blacker than *M. obscurus* but with more massive skull and much heavier dentition.

Above deep blackish brown, a little lighter beneath; many shades darker throughout than any specimen of *M. obscurus* in a series of nearly a hundred specimens from Suapure and vicinity, Venezuela. Forearm 35 mm. (34.5–36 in three specimens), against 38 in *obscurus;* first metacarpal 37 (40 in *obscurus);* same proportional differences in other external measurements.

The skull, as compared with that of *M. obscurus*, is relatively broader and shorter, with broader and shorter braincase, broader and heavier rostrum, and heavier dentition, especially noticable in the upper incisors. The infraorbital foramen is lower and opens more anteriorly.

Based on four specimens from Coiba Island, Panama, formerly referred (*antea*, p. 78) to *M. obscurus*, but on re-examination they prove to be distinctly different.

The ventral surface of *M. coibensis* is as dark as the dorsal surface in the darkest specimens of *M. obscurus*, while the dorsal surface is nearly black. The difference in size, and the strongly marked cranial differences, readily distinguish it from *M. obscurus*, the only species with which it needs comparison.

Molossus bondæ, sp. nov.

Type, No. 23661, ♀ ad., Bonda, Santa Marta, Colombia, Feb. 10, 1900; Herbert H. Smith.

Intermediate in size between *Molossus pretiosus* and *M. obscurus*, but nearer the latter. Above (type) reddish brown, clouded with darker; below paler, light reddish brown, slightly mottled with darker. Forearm and metacarpal III respectively 3 and 4 mm. (about one-twelfth) longer than in *M. obscurus*, and all the other external measurements proportionally greater. The skull is much larger, and relatively very much broader, with larger braincase, much wider palatal fossa, in correlation with the greater breadth of the skull. Compared with a large old skull of *obscurus*, the measurements are as follows: Total length, 18 mm. (in *obscurus* 16, in *pretiosus* 20.5); zygomatic breadth, 13 (in *obscurus* 11); width of braincase, 9.5 (in *obscurus* 9); width of palatal fossa, 3 (in *obscurus* 2.5). The dentition is correspondingly heavier, but the first premolar is conspicuously relatively much enlarged. The disparity in size is also especially striking in the lower jaw, which is one tenth longer in *bondæ*, with a corresponding increase in depth and in the size of the teeth. In respect to volume, the skull of *obscurus* is about one-half that of *bondæ*, and the skull of *bondæ* about one-half that of *pretiosus*.

Represented by the type (skin and skull) and three topotypes (in alcohol), collected by Mr. Francis C. Nicholas. The latter are dark brown, showing that the species is dichromatic, like *M. pretiosus*.

Promops barbatus, sp. nov.

Type, No. 17570, ♂ ad., La Union, Venezuela, Sept. 27, 1901; S. M. Klages.

Near *Promops milleri* Allen, from Guayabamba, Peru, but smaller, with much narrower skull and lighter dentition.

Above brownish black, the basal portion of the fur paler; below dark brown, considerably lighter than the dorsal surface; a large pale axillary area. Ears and membranes blackish, the extreme tip of the wing lighter; posterior border of forearm and basal portion of metacarpals slightly furred; edge of upper lip strongly bearded. Ears medium, thick and heavy, the outer border slightly concave; antitragus with rounded border, higher posteriorly than anteriorly.

Measurements. — Forearm, 55 mm.; thumb, 5; third finger: metacarpal, 57, first phal. 25, second phal. 25, third phal. 75; tibia, 16; hind foot, 12; calcar, 17. *Skull*, total length 23; width of braincase, 10.2.

In comparison with *P. milleri* the skull is about one millimeter shorter, and the braincase one millimeter narrower; it is more constricted interorbitally, with the rostral portion relatively much broader as compared with the braincase; palatal region narrower, with the palatal fossa much narrower, in correlation with the greater interorbital constriction; teeth narrower, but the small premolar relatively larger than in allied forms; lower canines slightly separated. It is much smaller than *P. abrasus*, and differs from it in cranial characters in much the same way as it does from *P. milleri*. These three forms, however, are closely related.

Dermonotus suapurensis, sp. nov.

Type, No. 17573, ♀ ad., Suapure, Venezuela, Oct. 26, 1901; S. M. Klages.

Similar in general features to *D. davyi* but very much larger. Forearm 51 mm., as against 45.5 in topotypes of *D. davyi*, and proportionate differences in other measurements, or about one tenth greater. *Skull*, total length, 17.2 (15 in *davyi*); zygomatic breadth, 10 (9 in *davyi*); width of braincase, 9 (8 in *davyi*); interorbital constriction, 4.5 (4 in *davyi*); height of braincase, 7.3 (6.5 in *davyi*); length of lower jaw, 8.2 (7 in *davyi*).

In bulk the skull is fully one third larger than in *davyi*, and nearly twice as great as in *D. davyi fulvus*. In the single known specimen the pelage is dark fulvous on the head, shoulders, and fore neck, much paler on the flanks and abdomen. Probably, however, it is dichromatic, like its allies of the Mormoopinæ.

Lonchophylla thomasi, sp. nov.

Type, No. 16120, ♂ ad., Cuidad Bolivar, Venezuela, Jan. 26, 1900; S. M. Klages.

Much smaller and much darker colored than *L. mordax* Thomas, from the coast near Bahia, Brazil; nose-leaf broader and shorter; skull smaller, rostral portion shorter, broader, and less tapering; braincase more convex and higher.

Above dark russet brown, the basal two thirds of the fur pale buffy whitish; under parts similar, little if any lighter than the dorsal surface; ears and membranes blackish brown.

Measurements. — Forearm, 30 mm.; thumb, 7.5; third finger: metacarpal 32, first phal. 12, second phal. 15, third phal. 6; fifth finger: metacarpal 29, first phal. 8.5, second phal, 8; tibia, 12; hind foot, 9; calcar, 5; ear above crown (dry), 8. *Skull*, total length, 21; width of braincase, 8.

Through the kindness of Mr. Gerrit S. Miller, Jr., I have had the opportunity of comparing the present specimen with a topotype of *Lonchophylla mordax* Thomas in the collection of the U. S. National Museum, from which it differs strikingly in coloration, and also in respect to the size and general conformation of the skull, which is much smaller than that of *mordax*, and very different in proportions, but with which it agrees in details of dentition and the undeveloped condition of the zygoma. Unfortunately it is represented by only a single specimen.

Named for Mr. Oldfield Thomas, the distinguished mammalogist of the British Museum.

Artibeus rusbyi, sp. nov.

Type, No. $\frac{12}{2}\frac{5}{3}\frac{5}{7}\frac{5}{7}$, ♂ (?) ad., Yungas, Peru (alt. 6000 ft.), Sept., 1885; Dr. H. H. Rusby. Named in honor of Dr. Rusby, the disguished botanist, who collected the type.

Size large, one of the largest species of the genus; skull very elongate; prominent face-streaks.

Above dark seal brown from the shoulders posteriorly; head, neck, and shoulders much lighter; ventral surface nearly as dark as the back; fur basally lighter, dull grayish white, showing at the surface on shoulders and neck; face with four distinct, conspicuous white stripes — a pair from the posterior base of the nose-leaf to the upper anterior base of the ears, and one on each side from the angle of the mouth to the lower anterior base of the ears; ears and membranes dark brown,

the wings lighter apically, becoming yellowish white at the extreme tips. Wing membrane from the base of the toes. Proximal two thirds of fore arm above and upper surface of tibia heavily furred; interfemoral membrane wholly naked below, as are the wing membranes, except a narrow band of thin woolly fur along the proximal half of the forearm.

Measurements (from dry skin). — Forearm, 71 mm.; third finger: metacarpal 69, first phal. 24, second phal. 39, third phal. 24; tibia, 26; hind foot, 19; tragus, 4; nose leaf, 6 x 11. *Skull:* total length, 32; zygomatic breadth, 18.5; width of rostrum at canines, 9; width of braincase, 14; width at first molars, 14; postorbital constriction, 7. The braincase is gently convex, long, and low.

This species is nearly related to *A. palmarum* of Trinidad and adjoining parts of northeastern South America, but differs in the lower, less convex, and more spreading braincase, broader palate and heavier dentition, the upper toothrow (canine and molar-premolar series) having a length of 11.5 mm. against 10.2 in *A. palmarum;* also in more prominent face stripes and darker general coloration.

It needs no comparison with any of the much smaller West Indian species, nor with *A. intermedius* of Costa Rica, characterized also by small size, but especially by a short, high-arched skull.

Artibeus insularis, sp. nov.

Type, No. 19579, ♂ ad., Island of St. Kitts, W. I.

Size large; coloration pale, including membranes. Dorsal surface pale reddish brown, paler below; membranes pale brown; no head stripes. Nose-leaf large.

Measurements (alcoholic specimen).— Head and body, 82 mm.; nose-leaf, 13.5 x 8; width of interfemoral membrane, 13; ear from crown, 15; forearm, 61; thumb, 15; third metacarpal, 58; third finger, first phal. 18, second phal. 40, third phal. 20; tibia, 25.5; foot, 16.5. *Skull* (imperfect): Width across m^2, 13; width of rostrum at base of canines, 8.6; upper toothrow (c–m^2), 11; length of lower jaw, 19.6; height at coronoid, 8; toothrow, 11.

Based on a single alcoholic specimen, a very old male, in excellent preservation, but with the skull badly broken. In external measurements it agrees very well with *A. jamaicensis*, in which the forearm ranges in five adults from 60–62

mm., averaging about 61. It is thus much larger than *A. parvipes* of Cuba, the forearm in which (in eight adults) ranges from 55–57 mm., averaging 5 mm. less than in *A. jamaicensis*. The skull, however, in *A. insularis* is much larger than in *A. jamaicensis*, the width across m^2–m^2 being 1 mm. (about one tenth) greater, and the rostrum at the base of the canines is also a millimeter wider, or about one eighth wider. This indicates a much larger and more massive skull than in *A. jamaicensis*, while the external measurements are about the same. The mandibular rami are straighter or less bowed and relatively slenderer. On the other hand, the skull is very much smaller than in *A. palmarum*, as are also the external measurements. It needs no comparison with *A. coryi*, which is a small species, about the size of *A. parvipes*.

Artibeus yucatanicus, sp. nov.

Type, $\frac{1}{10}\frac{20}{46}\frac{38}{9}$, ♂ ad., Chichenitza, Yucatan, March 17, 1896; Frank M. Chapman.

Differs from *A. intermedius* from southern Mexico and Central America in smaller size and absence of head stripes, in both these respects resembling the West Indian forms of the genus, especially *A. parvipes* of Cuba, from which it is not readily distinguishable. Forearm, 55 mm.; third metacarpal, 57; tibia, 24; foot, 14. Three skulls average: Total length, 27 (type, 27.5); zygomatic breadth, 17 (type, 17.5); mastoid breadth, 14.4 (type, 15); interorbital constriction, 7.2 (type, 7). Four skulls of *A. parvipes* measure the same in total length, but a little less in zygomatic breadth.

As previously stated (this Bulletin, IX, 1897, p. 4), the Yucatan form closely resembles the Cuban form,—much more than it does specimens from southern Mexico (Isthmus of Tehuantepec and Jalisco), these latter being referable to *A. intermedius* of Costa Rica, though not typical.

Specimens from the lower Orinoco, Merida (Venezuela), and Santa Marta (Colombia) are not satisfactorily separable from *A. palmarum* of Trinidad, although Merida examples have a rather broader and more massive skull. Specimens from western Colombia are darker, but in size and cranial characters are not satisfactorily separable from *A. palmarum*. A rather different type, however, occurs at Yungas, Bolivia,

as noted above. Probably a large amount of material, from widely separated localities, would disclose a greater or less number of additional fairly recognizable forms.

In this connection it may be worth noting that in many skulls of *A. planirostris* examined, from various localities, m^3 is found to be present on both sides in hardly more than fifty per cent. of the specimens; it is sometimes present on one side only, as has been noted by previous authors, being represented on the other side by the alveolus of the fallen tooth, while in fully one third of the skulls examined only the alveolus remains on either side. It may here be added that the specimen recorded above (*antea*, p. 79) from Boqueron, Chiriqui, as *A. intermedius* proves, on reëxamination, to be an example of *A. planirostris* with the third molar on each side absent.

Phyllostomus hastatus panamensis, subsp. nov.

Type, No. 18705, ♀ ad., Boqueron, Chiriqui, Oct. 6, 1901; J. H. Batty.

Much larger than true *P. hastatus hastatus* from eastern South America.

Above dark seal brown, lighter and slightly varied with gray on shoulders, sides of neck, and front of head; below lighter brown, the extreme tips of the hairs grayish, giving a slight grayish wash; ears, nose-leaf, and membranes blackish brown. Five other specimens (topotypes) are similar, none showing any tendency to a reddish phase.

Measurements (type, from dry skin). — Forearm, 90 mm.; third finger: metacarpal, 83, first phal. 21, second phal. 42.5, third phal. 26; tibia, 34; foot, 24; calcaneum, 24. *Skull*, total length, 39; basal length, 30; zygomatic breadth, 21.2; mastoid breadth, 19; postorbital constriction, 7.5; width of rostrum at base of canines, 9.5; upper toothrow (c–m^3), 14.3.

In six specimens (2 males and 4 females), the forearm ranges from 86 to 90, averaging 88; third metacarpal, 80–83.5, averaging 82.5. Four skulls (2 males and 2 females, 2 others being too imperfect for measurement), total length, 37–39 (38.2); zygomatic breadth, 21–22.2 (21.5); mastoid breadth, 18.6–20 (19.3); width of rostrum (6 specimens), 9.2–10 (9.5).

Pallas's *Vespertilio hastatus* was based on Buffon's ' La Chouve-souris Fer-de-lance,' said to be "fort commune en Amerique," which may be construed as the eastern coast

of South America, probably 'Surinam,' which may be considered as the type region of *P. hastatus* of modern authors. Assuming that specimens from the Island of Trinidad and eastern Venezuela (Cuidad Bolivar and Suapure) represent this form, *P. h. panamensis* is readily distinguishable by its much larger size. In six adult specimens—two from Trinidad and four from near Cuidad Bolivar — the skull ranges in total length from 35–37 (36); in zygomatic breadth, 19.5–20.3 (20); mastoid breadth, 18–19, and one old male 19.6 (18.5); width of rostrum, 8.2–9 (8.7). In nine specimens from the same localities the length of the forearm ranges from 80–82 (81); third metacarpal, 73–76 (74.6), as compared, respectively, with an average of 88 and 82.5 in *P. h. panamensis*.

The series of true *hastatus* includes both phases of coloration, the red and the dark; the dark specimens are similar in color to the *panamensis* series.

Phyllostomus hastatus cauræ, subsp. nov.

Type, No. 14473, ♂ (?) ad., Cali, upper Cauca Valley, Colombia; J. H. Batty.

Larger than *Phyllostomus hastatus panamensis*, but apparently not otherwise different.

Type, deep rufous brown, lighter and more golden on shoulders, and sides of neck; ventral surface lighter than back. Of nine other specimens (topotypes) eight are in the red phase—several are like the type and others somewhat darker—and two in the dark phase, or very dark seal brown without rufous.

Measurements (type, from dry skin). — Forearm, 93 mm.; third finger: metacarpal 84, first phal. 20, second phal. 42, third phal. 23; tibia, 32; foot, 24; calcaneum, 21. Upper toothrow (c–m^3), 14.6. In ten specimens the forearm measures 90–94 (92); third metacarpal, 82–86 (84.5), against 86–90 (88) and 80–83.5 (82.5), respectively, in *panamensis*.

The skulls are too imperfect to measure, all but one (a young adult) lacking the occipital portion. The dentition in both jaws is slightly heavier, and the rostrum is slightly broader than in *panamensis*, indicating a considerably larger skull.

Compared with true *hastatus*, the difference in size is strikingly marked, the forearm being fully one eighth longer,

with corresponding differences in other measurements. It differs much less from *panamensis*, but it apparently may well be recognized as a large Andean form of the *hastatus* group.

Note on Mexican Species of Otopterus.

In 1860 Saussure described a bat as *Macrotus mexicanus*, from an alcoholic specimen in poor condition collected at Yautepec, State of Morelos, Mexico. In 1890 Dr. Harrison Allen described *Macrotus bulleri* from slightly immature specimens taken at Bolaños, State of Jalisco, Mexico, and subsequently (Bats of N. America, 2d ed., 1894, pp. 41–43, gave a further account of it, based on additional material. These specimens I had previously referred provisionally (this Bulletin, II, 1889, p. 166) to *M. californicus*, and Dr. H. Allen made his comparisons with this species, making no reference to *M. mexicanus* Saussure.

In 1898 Dr. Merriam (Proc. Biol. Soc. Washington, XII, 1898, p. 18) compared topotypes of *M. mexicanus* with topotypes of *M. bulleri* and stated that he was "unable to find any characters on which the latter form can stand." I had previously recognized both *M. mexicanus* and *M. bulleri* as distinct species, and gave (this Bulletin, III, 1891, pp. 179–181) in considerable detail the differences that constitute them strongly marked forms; but I took for *M. mexicanus* a series of specimens from Tehuantepec City, State of Oaxaca, and compared them with series from Guadalajara and Bolaños, State of Jalisco. On recently going over the same material again, the two forms still seemed to me unquestionably specifically distinct. I thereupon asked Dr. Merriam to kindly loan me for examination topotypes of Saussure's *M. mexicanus*. These are now before me and confirm Dr. Merriam's statement that *M. bulleri* and *M. mexicanus* are identical, *M. bulleri* being a synonym of *M. mexicanus*. *Otopterus mexicanus* is therefore the small dark form, ranging from the State of Morelos westward to the Pacific coast and the Tres Marias Islands, so that a new name must be sought for the large light form occurring at Tehuantepec. This seems to be

furnished in the *M. bocourtianus* Dobson (1876), based on specimens from Vera Paz, Guatemala, which agree in size and other features with my Tehuantepec examples.

The measurements given by Saussure of his specimens are about all that his description furnishes in the way of diagnostic characters. These, in comparison with measurements of Tehuantepec specimens, of which I have a series of seven well-preserved alcoholic examples, indicate a much smaller animal, comparable with the so-called *bulleri*. Saussure's measurements here follow, with those of an average Tehuantepec specimen of *bocourtianus* in parentheses:

	mm.
Length of head and body	55 (61)
" " head	25 (27.5)
" " ears	21 (23)
" " tragus	10 (10)
" " nose-leaf, from base	7 (9)
" " forearm	51 (54)
" " tibia	23 (25)
" " calcar	10 (12)
" " tail	31 (35)

The synonymy of the two species will therefore stand as follows:

Otopterus bocourtianus (*Dobson*).

Macrotus bocourtianus Dobson, Ann. and Mag. Nat. Hist., XVIII, 1876, 436; Cat. Chiroptera, 1878, 467. Vera Paz, Guatemala.

Macrotus mexicanus J. A. Allen, Bull. Am. Mus. Nat. Hist., III, 1891, 179–181; *ibid.*, IX, 1897, 48. Tehuantepec City, Oaxaca, Mexico. Not of Saussure.

Otopterus mexicanus (*Saussure*).

Macrotus mexicanus Saussure, Rev. et Mag. Zool., XII, 1860, 486. Yautepec, State of Morelos, Mexico.

Macrotus californicus J. A. Allen, Bull. Am. Mus. Nat. Hist., II, 1889, 166. Bolaños, Jalisco, Mexico. Not of Baird.

Macrotus bulleri H. Allen, Proc. Am. Phil. Soc., XXVIII, 1890, 73; Mon. Bats. N. Amer., 2d ed., 1893 (1894), 41. Based on the Bolaños specimens, cited above.

Macrotus bulleri J. A. ALLEN, Bull. Am. Mus. Nat. Hist., III, 1890, 179; *ibid.*, IX, 1897, 48. The above-mentioned Bolaños specimens, and others from Guadalajara, Jalisco, Mexico.

Otopterus mexicanus MERRIAM, Proc. Biol. Soc. Washington, XII, 1898, 18. Tres Marias Islands, Bolaños, Jalisco, and the "State of Morelos," Mexico.

O. bocourtianus differs from *O. mexicanus* in much paler coloration throughout, including the ears and membranes as well as the pelage, and in much larger size, the forearm being 3 mm., the third metacarpal 2 mm., the total length of the skull nearly 2.5 mm., and the zygomatic breadth over 1 mm. longer, respectively, than in *mexicanus*. In a considerable number of specimens of each examined, the range of individual variation leaves an unbridged gap between the two forms.

(*Continued from 4th page of cover.*)

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. Pp. 77–132. January, 1902. Price, $1.00.

PART IV.—Shell Heaps of the Lower Frazer River. By Harlan I. Smith. Pp. 133–190, pll. vi, vii, and 59 text figures. December, 1902. Price, $1.00.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 1–270. January, 1902. Price, $3.00.

PART II.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 271–402. December, 1902. Price, $1.50.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. Pp. i–xvi, 1–332, pll. i–viii (5 colored), and 19 text figures. May, 1902. Price, $5.00.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. January, 1902. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. i–xxviii. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.

Volume I, 1881–86.....	Price, $5.00	Volume XI, Part III, 1900,	Price, $2.00
" II, 1887–90.....	" 4.75	" " " IV, 1901	" 1.75
" III, 1890–91.....	" 4.00	" " (Complete)...	" 5.00
" IV, 1892.....	" 4.00	" XII, 1899.....	" 4.00
" V, 1893.....	" 4.00	" XIII, 1900.....	" 4.00
" VI, 1894.....	" 4.00	" XIV, 1900.....	" 4.00
" VII, 1895.....	" 4.00	" XV, Part I, 1901..	" 3.00
" VIII, 1896.....	" 4.00	" XVI, 1902.....	" 5.00
" IX, 1897.....	" 4.75	" XVII, Part I, 1902..	" 1.50
" X, 1898.....	" 4.75	" " " II, "	" .75
" XI, Part I, 1898	" 1.25	" XVIII, " I, "	" 2.00
" " " II, 1899	" 2.00	" XIX, 1903.....	" 6.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued quarterly. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of from about 400 to 700 pages, and from about 25 to 60 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I.

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the Report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

PART VIII.—The Reptilian Subclasses Diapsida and Synapsida and the Early History of the Diaptosauria. By Henry Fairfield Osborn. Pp. 449–507, pl. xl, and 28 text figures. (With Contents and Index to Volume I.) November, 1903. Price, 2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

PART II.—The Basketry of the Tlingit. Pp. 229–277, pll. v–xviii, and 73 text figures. July, 1903. Price, $2.00.

(*Continued on 3d page of cover.*)

14

Mammals Collected in Alaska by the Andrew J. Stone Expedition of 1903.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XX, Article XXIV, pp. 273–292,

New York, Sept. 8, 1904.

The Knickerbocker Press, New York

Article XXIV.—MAMMALS COLLECTED IN ALASKA BY THE ANDREW J. STONE EXPEDITION OF 1903.

By J. A. Allen.

The mammals obtained by the Andrew J. Stone Expedition of 1903 number 873, including about 30 large mammals (moose, sheep, bears, etc.), and represent 28 species. About 140 specimens were collected on the Bering Sea side of the Alaska Peninsula, near Muller Bay (Port Muller of most maps), and the remainder on the Kenai Peninsula, principally near Seldovia. A few bear skulls were obtained on Kadiak Island.

Mr. Stone, with his two assistants, Messrs. Malcolm P. Anderson and Belmore H. Browne, who also accompanied him in 1902, left Seattle, April 24, and after a sea voyage of about twenty days reached Sand Point, Alaska, May 14. Two hunters were engaged at Unga Island, and the head of Portage Bay was reached on the night of May 15. The next day the party (five men in all) began to transport their supplies over the portage to Herendeen Bay, this arduous work occupying four days; the snow being deep and in places soft, the work proved difficult and exceedingly fatiguing. On May 23 the first hunting camp was established, well up on Muller Bay, for the purpose of obtaining a series of the large brown bears which inhabit the Alaska Peninsula west of the tree line. The first bear was secured on the 24th, a fine large female, with two cubs, one of which was secured alive and sent to the New York Zoölogical Society, and is still (July, 1904) living in the Society's Garden. The next, a fine old male *Ursus dalli gyas*, was killed on the 29th, the skin and entire skeleton being preserved; it proved to be one of the largest bears ever taken on the Alaska Peninsula, its approximate weight being 1600 pounds. By the evening of June 12 ten fine specimens had been obtained, seven of which were fully adult; nine others were seen. This ended the bear hunt, and preparations were immediately made to return to Sand Point, which was reached on the evening of June 18.

Mr. Anderson had in the meantime devoted himself to the collecting of small mammals, of which he obtained six species, including a good series of topotypes of *Citellus stonei.*

On June 21 the party left Sand Point for Kadiak Island and Cook Inlet. A short stop was made at Kadiak Island on June 24, and Seldovia was reached the next day; on the 26th the collecting of small mammals and birds was begun and prosecuted vigorously at this point till August 3. A little collecting was done at Barabori, near Homer, August 6–8, when the work was transferred to Sheep Camp, on Sheep Creek, and continued there till September 9, and later at Upper Sheep Camp, September 12–21, and at Moose Camp from September 25 to October 8.

In order to obtain sheep, moose, and caribou it was necessary to establish a series of camps during August at suitable localities for the fall hunt for these animals, in locating and preparing which Mr. Stone was greatly indebted to the voluntary services of Mr. John Gillpatrick, "sailor and hunter," of whose efficiency Mr. Stone speaks in his report in the highest terms. On August 3 Mr. Stone, with his two assistants, three Indian helpers, and Mr. Gillpatrick, left Seldovia with the supplies for these camps, which were most judiciously selected, as shown by the results of the fall hunt—3 bears, 16 white sheep, and 6 moose, all in good fall pelage, which were preserved with special care for mounting as groups. Also several hundred small mammals and many birds were obtained at these camps. The hunt for caribou, however, proved a failure, the small band of *Rangifer stonei* supposed to be yet ranging in the Caribou Hills having crossed the country into the mountains seat of Kussilluf Lake, about twenty-five miles from their old range. Seldovia was reached on the return trip, October 10, with the camp outfit and specimens, thus ending a very successful season's work.

The following brief account of the principal localities at which collections were made is compiled from Mr. Anderson's field notes.

Herendeen Bay and Muller Bay, Alaska Peninsula, May 19–June 13.—At Herendeen Bay, May 19, "the vegetation was

just beginning to feel the effects of spring. The long grass that covers the hills was dead and matted down. The alders, which form almost the only ligneous vegetation, were just beginning to show their leaf buds. At Muller Bay, which we reached on May 22, conditions were much the same; but before we left there on June 13, new grass was beginning to show beneath the old, and the alders were in blossom."

Seldovia, June 26–August 3.—Seldovia is near the southwestern point of the Kenai Peninsula. "Here the hills are forested with spruce, with here and there a small grove of poplars. The woods are open in but few places, there being for the most part an undergrowth of alder bushes, devil club, salmonberry, and other plants that are less conspicuous."

Sheep Camp, Sheep Creek, August.—At "our upper camp on Sheep Creek, I found conditions somewhat different from those existing at Seldovia. The woods here are decidedly mixed; poplars and birches intermingle with spruces, and in the bottomland of Sheep Creek, as well as on the hillsides, there are large patches of alder bushes and willows."

Caribou Camp, September 3–9.—This camp was at timberline, and "the bare hilltops and grassy hillsides afforded a new kind of field for trapping. . . . In ascending the mountains above timberline, one passes through a belt of alders and comes out upon a comparatively level, very open country, which rises gradually and finally merges into the actual mountains. This 'level' country is cut up into little hills and hollows. The hilltops are covered with a dense mat of vegetation composed largely of 'spruceberry' (black crowberry) bushes, cranberry and blueberry bushes, and several forms of moss and lichen. The hollows and valleys have deeper soil, with grass and various other herbaceous plants."

Moose Camp, September 25–October 8.—Also at timberline. "Here, where the spruce forest ends, a region of tall grass and patches of alders begins."

The fauna of the western end of the Alaska Peninsula is of course very different from that of the Kenai Peninsula, only three of the species found near Muller Bay being taken on

the Kenai Peninsula, namely, *Marmota caligata*, *Microtus operarius*, and *Sorex personatus*.

This is the third and last of the series of expeditions to Alaska and northern British Columbia, organized under the leadership of Mr. Andrew J. Stone, to secure Arctic mammals and birds for this Museum. The means for this enterprise were provided in 1901 by friends of the Museum (see this Bulletin, XVI, 1902, p. 215), and the generous supporters of this work have every reason to feel gratified with the results. The Museum has by this means been placed in possession of the finest series of the large game animals of subarctic America anywhere extant, besides several thousands of small mammals, representing abundantly nearly all the species of the regions visited. Material of the best character has been provided for groups of the big Alaska Brown Bear, Alaska Black Bear, Alaska Grizzly, the big Alaska Moose, two species of Caribou, two species of Mountain Sheep, the Mountain Goat, and the Sitka Deer. Among the smaller mammals several new species were discovered, others previously little known have been secured in large series, and the large number of birds obtained has greatly enriched our ornithological collection.

1. **Alce**[1] **gigas** *Miller*. Alaska Moose.—Six specimens, including three adult males, an adult female, a two-year-old male, and a male calf, taken in the rolling hilly country north of Chugachik Bay, Sept. 25–Oct. 2. This series includes "one of the largest and finest bulls ever secured on the Peninsula," the whole forming as complete a group for mounting "as could be selected from a thousand." They were prepared with special care, with a view to their use for this purpose.

2. **Rangifer stonei** *Allen*. Stone's Caribou.—No speci-

[1]According to Dr. T. S. Palmer (Index Generum Mammalium, 1904, p. 86) *Alce*, as a generic name for the Old World moose (elk) dates from Frisch, 1775, thus antedating the form *Alces* of Gray (1821) and of later authors, and also Blumenbach's use of *Alce* (1799) for the extinct Irish Elk (*Megaceros hibernicus* Owen, 1844). Hence *Paralces* Allen, 1902, is a synonym of *Alce* Frisch, 1775.

mens were obtained, although a week was spent in search for them in the Caribou Hills, near Seldovia, where a small band was supposed still to range. It was found later that they had gone across into the mountains to the east of Kussilluf Lake, about 25 miles from their old range.

3. **Ovis dalli kenaiensis** *Allen*. KENAI WHITE SHEEP.— Sixteen specimens—7 adult females, 4 adult and 1 young adult rams, and 2 male and 2 female lambs; also an additional head. The four adult rams were taken in the mountains at the head of Kussilluf Lake, by Mr. Herbert, Oct. 3–5, and the others in the Sheep Mountains, at the head of Sheep Creek, Sept. 11–20. No adult rams were met with during the Sheep Mountain hunt, and a special trip later of 400 miles' travel was made for old rams. Although the localities where the sheep were taken were only five miles apart, the point where the rams were obtained could be reached only by a circuitous journey of about 200 miles and return.

These specimens are in good fall pelage and furnish the long-desired material for a group, the specimens of this species obtained on previous expeditions having all been in the short summer coat.

4. **Sciurus hudsonicus** *Erxleben*. HUDSON BAY RED SQUIRREL.—Thirty-three specimens, taken as follows: Seldovia, 4, July 4–21; Sheep Creek, 20, Aug. 14–Sept. 1; Moose Camp, north of Chugachik Bay, 8, Sept. 28 and Oct. 2–7. They are thus nearly all in summer pelage, even the October specimens having acquired but little of the winter coat.

"The Red Squirrel is rather scarce in the woods at Seldovia. Although I saw the signs of several I did not secure any till some were brought in by natives during July." On Sheep Creek they "were very common in the spruces, both in the valley and on the hills. On August 16 I shot a red squirrel from a large poplar. He was rapidly cutting the leaves from the tree, and upon examination I found that each leaf that he had cut bore an abnormal growth [gall], probably caused by the sting of an insect in laying its eggs. I opened

a number of these growths and found them filled with plant lice; one, however, had a large white larva in it. As there were many leaves on the poplar which did not have this abnormality, and as no leaves were cut which did not bear it (I examined a large number), the inference is that the squirrel desired these excrescences for food."—M. P. A.

5. **Citellus stonei** *Allen.* STONE'S GROUND SQUIRREL.—

Citellus stonei ALLEN, Bull. Am. Mus. Nat. Hist., XIX, 1903, pp. 533 and xvii, Oct. 10, 1904. Type locality, Stevana Flats, Alaska Peninsula; erroneously given in the original description as Wrangel, Alaska (corrected, *l. c.*, p. xvii).

Fifteen specimens (all practically topotypes), Alaska Peninsula, taken as follows: Herendeen Bay, 7, May 19 and 20; Muller Bay, 8, May 24–June 8.

The type was collected by Mr. Stone, in the hills north of Stevana Flats, June 7, 1902; the present series was taken in the same immediate region, and all within a distance of thirty miles along the coast at Muller Bay. They are all practically indistinguishable from the type, having been taken at the same season. The original description therefore requires no modification further than to add the measurements as taken by the collector from the fresh specimens, as follows: 5 males, total length, 361 (341–383—only one specimen above 365 and only one below 355); tail vertebræ, 94 (83–110); hind foot, 59 (56–63); ear, 15.4 (14–16): 10 females, total length, 333 (314–352); tail vertebræ, 86 (78–94); hind foot, 56 (54–57); ear, 13.7 (12–15).

Spermophiles, says Mr. Anderson, were living at Herendeen Bay "in the dryer portions of a valley which extends back from the head of the bay. In crossing from Portage Bay to the Bering Sea side of the peninsula a number were seen running about in the snow which then covered the higher parts of the trail. They were taken later at Muller Bay, where they had burrows in banks and hillsides."

6. **Marmota caligata** (*Eschscholtz*). HOARY MARMOT.—Seven skins and skulls and 3 additional skulls, Seldovia, July

17–28. A single barren female was taken at Muller Bay, where it had its burrow on a hill near the shore. No others were seen on the Alaska Peninsula, nor even signs of any. At Seldovia, where the specimens were obtained from natives, they were said to inhabit rocky hills at the head of the bay on which Seldovia is situated.

7. **Evotomys alascensis** *Miller.* Alaska Red-backed Vole.—Six specimens, Muller Bay, May 31–June 12

This species differs strikingly from *E. dawsoni* in its much lighter colors, the red of the back being very much paler and the sides much lighter, the ventral surface pure light gray, and the tail rusty buff all around instead of dusky above. It is about as much lighter than late spring specimens of *dawsoni* as the late spring pelage of *dawsoni* is lighter than the late summer pelage of *dawsoni*. *E. alascensis* also differs strongly in cranial characters from the *dawsoni* group.

The two males measured respectively in the flesh, total length, 144, 146; tail vertebræ, 32, 35; hind foot, 19, 20; ear, 13, 14. The 4 females are smaller: total length, 137.5 (134–140); tail vertebræ, 33 (30–35); hind foot, 19 (18.5–20); ear, 12.9 (12–13.5).

These specimens have been compared with six topotypes of *E. alascensis*, kindly loaned me by Dr. F. W. True, Head Curator of the Department of Biology, U. S. National Museum. They differ only in the coloration of the ventral surface, which in the Muller Bay (June) specimens is clear ashy white, and in the St. Michaels (October and November) specimens is more or less buffy, a difference clearly due to difference of season.

This species was apparently rare at Muller Bay, where persistent trapping yielded only six specimens.

8. **Evotomys dawsoni orca** (*Merriam*). Orca Red-backed Vole.—One hundred and forty-seven specimens, taken as follows: Seldovia, 45, June 27–July 31; Barabori, 8, Aug. 6, 8, and 28–30; Sheep Creek, 5, Aug. 21–25 and Sept. 12; Caribou Camp, 7, Sept. 3–9; Moose Camp, 82, Sept. 25–Oct.

8. Of this number only about 23, or about one sixth, are fully adult. These consist of 14 females and 9 males, and measure as follows: 9 males, total length, 143 (140–149); tail vertebræ, 35 (32–38); hind foot, 19 (18–20); ear, 13 (12–14): 14 females, total length, 144.4 (137–153); tail vertebræ, 34 (30–40); hind foot, 19 (18–20); ear, 13.5 (12.5–15). Of the remainder quite a number are so young as to fall below 110 in total length, while about one third fall between 110 and 120, and another third between 120 and 130.

These statistics bear out the statement that *orca* averages distinctly larger than true *dawsoni*.

This species was found to be very plentiful at all points where trapping was done. Their haunts are "logs and mossy banks and stumps in the spruce timber, but in a number of instances they were found digging burrows in moist earth in interspaces in the timbered region. Specimens were often found with their mouths filled with the seeds of some herb."

9. **Microtus miurus** *Osgood.* Alaska Mountain Vole.—One hundred and twenty-six specimens, all taken at Sheep Creek, Sept. 12–21. Only 24, or about one fifth, are adult, and of these only five are males, although the sexes are about equally represented in the series as a whole. Measurements: 5 males, total length, 154 (145–158); tail vertebræ, 26 (22–29); hind foot, 19.8 (19.5–20); ear, 13.4 (12–14): 19 females, 149.7 (140–159); 29 (24–30); 19.7 (19–20); 13.2 (12–14).

According to Mr. Anderson's notes this species was found "only about the edges of some mossy swamps in little valleys between the hills." It was taken only at the "upper sheep camp," on Sheep Creek.

10. **Microtus operarius** (*Nelson*). Nelson's Vole.—One hundred and seventy-three specimens, collected as follows: Muller Bay, 96, May 23–June 12; Seldovia, 48, June 27–August 19; Sheep Creek, 5, August 20–22; Barabori, 4, August 24, 28, and Sept. 1; Caribou Camp, 8, Sept. 4–8; Moose Camp, 12, Sept. 27–Oct. 8.

This was the only species of *Microtus* taken on the Alaska

Peninsula, where it was abundant, and it seems to be equally abundant on the Kenai Peninsula, where it was found at all points where collections were made. There is no appreciable difference between specimens from Muller Bay and the Kenai Peninsula. There was, as would be expected, a much higher proportion of adults in the Muller Bay series, taken in May and early June, than in the Kenai series, taken much later in the season. In the former about one half were adult, and in the latter only about one fifth. The Muller Bay adults measure as follows: 20 males, total length, 174.5 (160–192, with only two above 184); tail vertebræ, 41 (38–50, with only two above 45); hind foot, 21 (20–22); ear, 12 (11–13): 18 females, 168 (155–180); 40.7 (36–50, only two above 45); 20.6 (20–21); 12 (11–13).

At Muller Bay, says Mr. Anderson, "the runways of this animal were seen almost everywhere I went, especially in the lowlands in places where the soil was not moist. . . . During our stay at Muller Bay almost every adult female obtained was found to have from six to eight embryos." In Seldovia it was found "most abundant in some coarse grass growing beside a salt-water slough near the village. In this they had burrows and long distinct runways. Their runways were also often found in the more common grass which grows in most openings, and numbers were trapped in such places."

11. **Synaptomys dalli** *Merriam.* Dall's Lemming Mouse.—Sixty-six specimens, taken as follows: Seldovia, 40, June 27–August 3; Sheep Creek, 12, August 14–26; Barabori, 2, August 30; Caribou Camp, 5, Sept. 7–9; Moose Camp, 7, Sept. 25–Oct. 5. About one third are adults, of which only 4 are females, 15 being males. They measure as follows: 15 males, total length, 130 (124–134); tail vertebræ, 23.7 (21–25); hind foot, 19.3 (19–21); ear, 13.7 (12–15): 4 females, 132 (129–134); 25.5 (24–27), 19 (18–20), 12.5 (13–14). The females average larger than the males, but they are also obviously older than the average of the males, the difference in size being evidently due to difference of age.

At Seldovia this species was found "most frequently in

little marshy meadows, but was also sometimes trapped in timber in places like those inhabited by red-backed mice." At Caribou Camp and at Moose Camp they were also found in similar situations.

12. **Dicrostonyx nelsoni** *Merriam.* NELSON'S LEMMING.—Three specimens, 2 adult and 1 young, Muller Bay, June 5, 7 and 12.

"Not at all common. Their burrows were round, clean-cut holes about an inch and a half in diameter, running directly down into the earth for some inches. In most places I saw no signs of the earth which had been removed in making the burrow."—M. P. A.

13. **Fiber spatulatus** *Osgood.* NORTHWEST MUSKRAT.—One specimen, Seldovia, Alaska, Oct. 13. Total length, 490; tail vertebræ, 215; hind foot, 70; ear, 20. The skull is so badly crushed that it is not available for critical comparison with allied material.

14. **Erethizon epizanthus myops** *Merriam.* ALASKA PORCUPINE.—One specimen, Seldovia, Aug. 1, brought in by an Indian.

"Occasionally found in the neighborhood of Seldovia."—M. P. A.

15. **Lepus americanus dalli** *Merriam.* DALL'S VARYING HARE.—Nine specimens, of which only 1 is fully adult, 6 are about one fourth grown, and two are about three fourths grown. The adult is from Barabori (Sept. 9) and the young are all from Sheep Creek (Aug. 11–30).

This is a very dark form of the *L. americanus* group, the prevailing color in summer pelage of the adult and the two nearly grown young being blackish, and hence very much darker than *L. americanus saliens* in corresponding pelage; but there are no very obvious cranial differences between the two forms.

Lepus americanus dalli was based on a skull from the Nulato River, and the external characters of the form have

not yet been made known. These specimens are referred to it provisionally, in preference to adding a new name in this very imperfectly known group.

Summer specimens of hares of the *L. americanus* group seem difficult to capture, and very few are yet extant in museums. Mr. Anderson says of the present specimens: "The first rabbits seen on the Kenai Peninsula were those taken on Sheep Creek in August. Here they had numerous runways in the tall grass of the bottomland among the alders and willows. I succeeded in shooting a number of young, but did not secure any adults until Mr. Browne caught one in a snare. Later two [young] adults were taken in a dry, grass-grown flat near our 'Barabori' camp." At Moose Camp (at timberline), although no specimens were secured, "the number of runways was sufficient to show that they were present in numbers, showing that they range both in lowland and highland."

16. **Phoca richardsi** (*Gray*). HARBOR SEAL.—One specimen, young, with the permanent dentition not fully developed.

17. **Vulpes alascensis** *Merriam*. ALASKA RED FOX.—Two specimens, skins and skulls, male and female, Muller Bay, June 2. Male, total length, 982; tail vertebræ, 445; hind foot, 190. Female, 929, 394, 165.

18. **Vulpes kenaiensis** *Merriam*. KENAI RED FOX.—One specimen, skin and skull, Kenai Peninsula (exact locality and date not recorded).

This species was originally described from a skull, and the external characters do not appear to have as yet been described.

Compared with *V. alascensis* the coloration is much darker throughout, the golden fulvous of *alascensis* being replaced with dark rufous, with much more and deeper black on the ears and feet, tail more fringed with black and with a larger apical area of white; lower back varied with buffy gray; chin strongly dusky; throat and fore neck superficially white, the fur basally blackish; posterior part of ventral area superficially white, like the throat, the fur dingy gray basally;

rest of lower surface dark rufous, the fur blackish basally along the median line. Ears larger, and tail shorter than in *alascensis*, but much fuller.

19. **Ursus dalli gyas** *Merriam.* ALASKA PENINSULA BEAR. —One specimen, a very old male, skin and skeleton, Muller Bay, May 29.

The ten fine specimens of large brown bears taken by Mr. Stone at Muller Bay throw much light on the question of the number of species of bears on the Alaska Peninsula. Of these specimens 9 belong to the form I recently described (this Bulletin, XVI, 1902, pp. 141–143, pll. xxx, xxxi) as *Ursus merriami* and one to *Ursus dalli gyas* Merriam, based on specimens from Pavlof Bay, on the opposite side of the peninsula from Muller Bay. The two species prove to be readily distinguishable by both cranial and external characters. With the material now in hand it is evident that the type of *U. merriami* (skull) is a middle-aged male, and that the 'topotype' (skin) is an old male *U. gyas*, this skin agreeing in coloration and character of pelage with the present old male skin of *gyas*, and not with the series of skins of *merriami*.

The collector's measurements of the *gyas* specimen are as follows: Total length, 2057; tail vertebræ, 127; hind foot, 349; height at shoulder, 1068. Approximate weight, 1600 pounds. Skull, greatest length (front of premaxillaries to end of occipital crest), 447; zygomatic breadth, 260; mastoid breadth, 250. (For further skull measurements, see table, p. 290.)

Pelage short, coarse and harsh; general coloration very dark brown; claws heavy, but little curved, rather light brown, with a strongly defined longitudinal whitish streak on the convex surface.

20. **Ursus merriami** *Allen.* MERRIAM'S BEAR.—Nine specimens, skins and skulls, Muller Bay, May 24–June 12. Of these, two are adult males and four are adult females, two of which are very old; the other three are yearlings.

The pelage is very long, soft, and woolly; color of dorsal area light yellowish brown, sides and limbs dark brown. Claws short and much curved, dark brown, the color varying somewhat in different specimens.

The collector's measurements are as follows:

No.	Sex.	Length.	Tail vertebræ.	Hind foot.	Height at shoulder.
21807	♂	1880	152	330	1067
21809	♂	1981	152	381	1092
21801	♀	1702	152	318	914
21803	♀	1880	152	305	864
21808	♀	1880	152	305	991
21810	♀	1829	152	318	1016

The long, soft, woolly coat and the light yellowish brown color of the dorsal area are in strong contrast with the short, harsh, and very dark dorsal area in *U. d. gyas*.

The type of *U. merriami*, a skull, is apparently not an average example, this skull being relatively longer and narrower than any of the six skulls here referred to that species, as shown by the detailed measurements given in the subjoined table, which, for comparison, gives the measurements of (1) an old male skull of *U. middendorffi* from Kadiak Island; (2) an old male skull of *U. dalli gyas* from Muller Bay, Alaska Peninsula; (3) the type of *U. merriami*, and of the six other skulls referred to it, all from Muller Bay; (4) an old female skull of *U. kidderi* from the hills south of Kussilluf Lake, Kenai Peninsula. Nos. 19766 (*U. middendorffi*), and 21802 (*U. dalli gyas*) are very old male skulls; Nos. 21807, 21809, and 17622 (type) are middle-aged male skulls of *U. merriami;* Nos. 21810, 21808, 21801, and 21803 are female skulls of *U. merriami*, of which 21810 is very old, with all the sutures obliterated; 21803 (unfortunately imperfect) is also old, but most of the sutures are still distinct, while the other two skulls are middle-aged.

This series of specimens shows (1) that there are two distinct types of bears on the Alaska Peninsula; (2) that *U. merriami* is much more nearly related to *U. kidderi* than to *U. dalli gyas;* (3) that neither of them are very closely related to *U. middendorffi;* (4) that the examination of a much larger amount of material is necessary before the number of species and the relationships of the big Alaska brown bears can be satisfactorily settled. I here give (Figs. 1–9) three views each of three quite distinct types of skulls, namely, the big Kadiak Bear (*U. middendorffi*), and the two species occurring

on the Alaska Peninsula, all from material obtained by Mr. Stone. As the type skull of *U. merriami* has already been figured (this Bulletin, XVI, 1902, pll. xxx and xxxi), I have selected an average skull from the series obtained in 1903, which should be carefully compared with the figures of the type skull, which is either exceptional in its narrowness and great elongation, or else the later series of specimens now referred to *U. merriami* represents still a third species, related to the *kidderi* type of bear.

The figures are all made to the same scale, and are about one fourth natural size.

21. **Ursus middendorffi** *Merriam.* KADIAK BEAR.—Eight skulls, mostly adult, Kadiak Island.

22. **Ursus kidderi** *Merriam.* KIDDER'S BEAR.—Two specimens (skins and skulls), an adult and yearling, both females, Caribou Hills, Sept. 3 and 4. Adult female, total length, 1778; tail vertebræ, 178; hind foot, 280; height at shoulder, 916; skull, greatest length, 355; zygomatic breadth, 217; mastoid breadth, 148. (For further measurements see table, p. 291.)

In age the adult female (No. 21811) is comparable with No. 21803 of *U. merriami.* The external measurements, however, are much less, except that the tail is longer; the skull measurements for the most part agree closely with some of the younger female skulls of *U. merriami*, even to the size of the teeth.

23. **Ursus americanus** *Pallas.* BLACK BEAR.—One specimen (skin and skull), adult female, Kussilluf Hills, August 19.

24. **Putorius cicognanii alascensis** (*Merriam*). JUNEAU WEASEL.—Six specimens, four males and two females, taken as follows: Sheep Creek, 2, Aug. 14 and 20; Seldovia, 4, Oct. 24. One of the Seldovia specimens is in the white winter pelage, and one is in change, the other two still retaining the summer coat, somewhat lightened, however, by the incoming

Fig. 1. *Ursus merriami*, No. 21807, middle-aged male, Muller Bay, Alaska Peninsula. ½ nat. size.

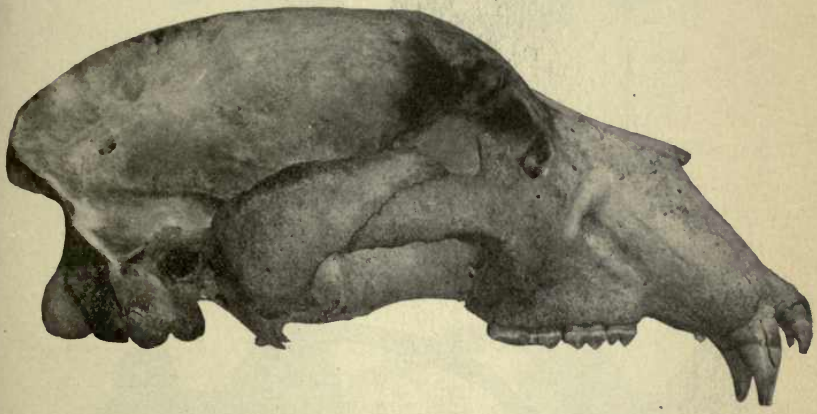


Fig. 2. *Ursus dalli gyas*, No. 21802, old male, Muller Bay, Alaska Peninsula. ½ nat. size.

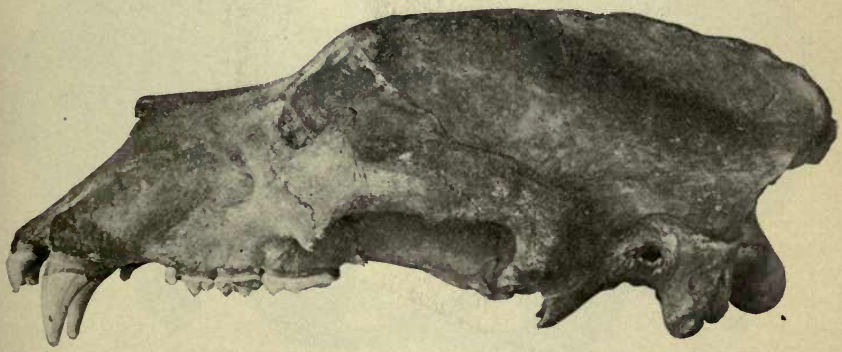


Fig. 3. *Ursus middendorffi*, No. 19766, old male, Kadiak Island, Alaska. ½ nat. size.

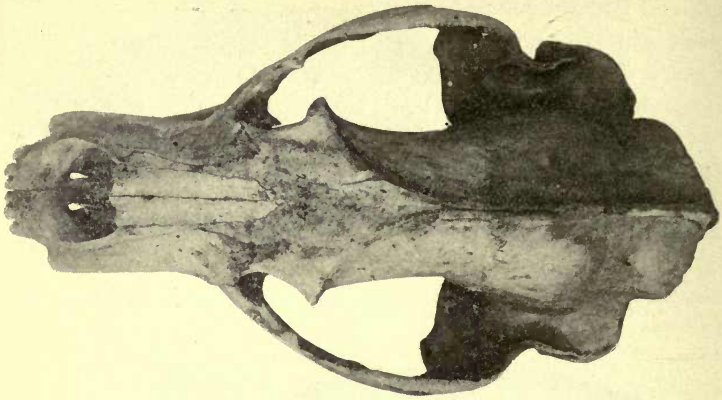


Fig. 4. Same specimen as Fig. 1.

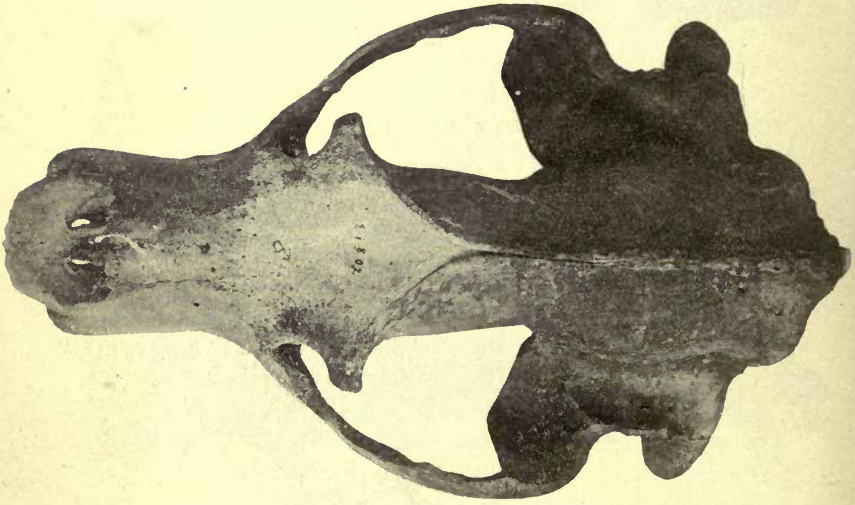


Fig. 5. Same specimen as Fig. 2.

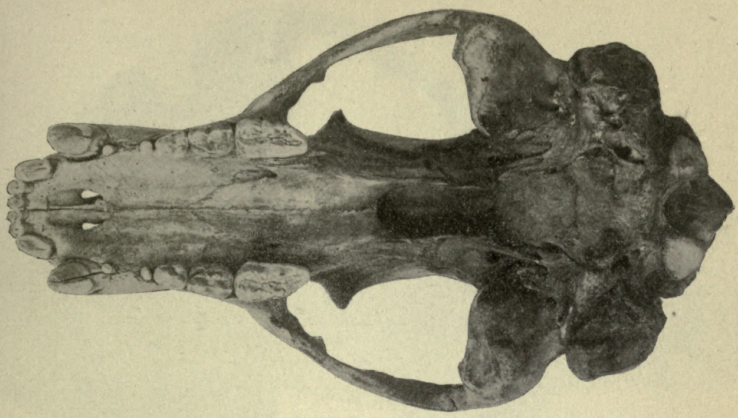


Fig. 7. Same specimen as Fig 1.

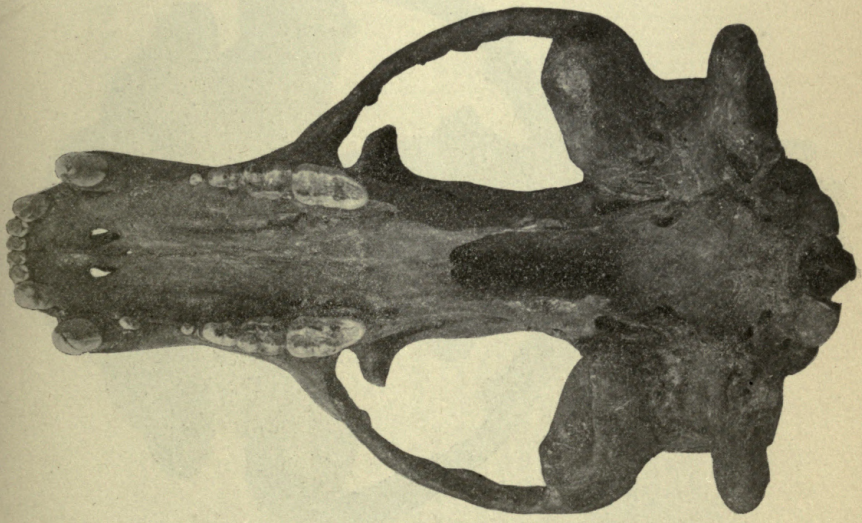


Fig. 8. Same specimen as Fig. 2.

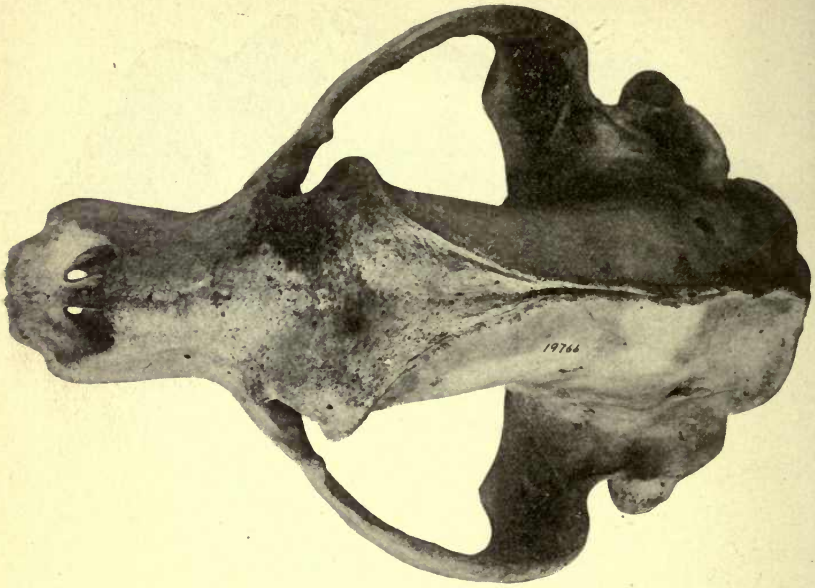


Fig. 6. Same specimen as Fig. 3.

Fig. 9. Same specimen as Fig. 3.

MEASUREMENTS OF TEN SKULLS OF ALASKA BROWN BEARS.

	U. middendorffi.	*U. dalli gyas.*	*U. merriami.*							*U. kidderi.*
	19766 ♂	21802 ♂	21807 ♂	21809 ♂	17622 [1] ♂	21810 ♀	21808 ♀	21801 ♀	21803 ♀	21811 ♀
Greatest length (front of premax. to end of occip. crest)	431	447	378	363	396	370	363	358	—	355
Basal length (gnathion to post. border occip. condyles)	400	408	353	358	375	343	340	318	—	325
Basilar length (gnathion to basion)	370	387	325	336	350	332	318	300	—	305
Occipito-nasal length	365	385	317	337	328	314	302	303	—	308
Occipito-sphenoid length	107	107	90	93	101	83	85	82	—	85
Palatal length	206	211	179	184	198	185	172	172	191	173
Postpalatal length (to basion)	166	175	145	153	151	137	147	133	—	133
Basion to plane of front of last upper molar	246	263	222	226	230	211	212	202	—	202
Zygomatic breadth	302	260	210	220	210	223	195	190	221	217
Interorbital breadth	101	92	73	88	81	84	77	70	87	81
Breadth across postorbital processes	142	141	113	119	110	128	105	104	124	110
Mastoid breadth	243	250	170	182	169	172	154	159	—	148
Breadth of rostrum at base of canines	101	101	87	90	85	86	77	76	88	78
Premolar-molar series (p^4-m^2)	77	81	78	72	79	73	75	74	78.5	73
Molar^2, greatest length	37	39	38	35	37.5	35	37	37	37	36
" " width	19	20	20	19.5	21	19	18	19	20	20

[1] Type.

winter coat. The two August specimens, both apparently females, are very much darker.

A female from Homer, collected by the Stone Expedition in 1901, and formerly identified (this Bulletin, XVI, 1902, p. 228) as *P. arcticus kadiacensis*, is to be referred here.

The four males measure, total length, 334 (312–346); tail vertebræ, 92 (89–94); hind foot, 46 (43–49); ear, 22 (21–23). Two females, 270 (260–280), 71.5 (70–73), 35.5 (34–37), 18 (17–19).

25. **Mustela americana** *Turton.* American Martin.—Two skulls, Seldovia. These skulls greatly exceed in size the very largest skulls of a large series of *M. americana* from New Brunswick, but fall considerably short of the measurements given by Mr. Osgood for the type skull of *M. a. actuosa.*

26. **Sorex personatus** *I. Geoffroy.* Common Shrew.—One hundred and eighty-six specimens, collected as follows: Muller Bay, 4, June 1–7; Seldovia, 97, June 26–August 2; Barabori, 9, August 6 and 28–Sept. 1; Sheep Creek, 35, August 13–26; Caribou Camp, 14, Sept. 3–9; Moose Camp, 27, Sept. 25–Oct. 6.

At Muller Bay "shrews were quite scarce," but on Kenai Peninsula this species was apparently everywhere abundant.

27. **Sorex obscurus alascensis** *Merriam.* Alaska Shrew.—Thirty-seven specimens: Seldovia, 26, June 26–August 3; Barabori, 1, Sept. 1; Caribou Camp, 7, Sept. 3–9; Sheep Creek, 3, Sept. 12–14.

Evidently less abundant than the preceding, but widely dispersed, though apparently not met with at Moose Camp, where *S. personatus* was very abundant.

28. **Sorex eximius** *Osgood.* Osgood's Shrew.—Two specimens, Barabori, Sept. 9, and Moose Camp, Oct. 1.

This species, previously known only from the type, taken at Tyonek, Cook Inlet, Alaska, Sept. 14, 1900, by Osgood and Heller, is evidently either not numerous or very hard to capture, as of 225 Shrews taken by Mr. Anderson only two were of this species.

(*Continued from 4th page of cover.*)

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. Pp. 77–132. January, 1902. Price, $1.00.

PART IV.—Shell Heaps of the Lower Frazer River. By Harlan I. Smith. Pp. 133–190, pll. vi, vii, and 59 text figures. December, 1902. Price, $1.00.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 1–270. January, 1902. Price, $3.00.

PART II.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 271–402. December, 1902. Price, $1.50.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. Pp. i–xvi, 1–332, pll. i–viii (5 colored), and 19 text figures. May, 1902. Price, $5.00.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. January, 1902. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. i–xxviii. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.

Volume I, 1881–86.....	Price, $5.00	Volume XI, Part III, 1900,	Price, $2.00
" II, 1887–90.....	" 4.75	" " " IV, 1901	" 1.75
" III, 1890–91.....	" 4.00	" " (Complete)...	" 5.00
" IV, 1892.....	" 4.00	" XII, 1899.....	" 4.00
" V, 1893.....	" 4.00	" XIII, 1900.....	" 4.00
" VI, 1894.....	" 4.00	" XIV, 1900.....	" 4.00
" VII, 1895.....	" 4.00	" XV, Part I, 1901..	" 3.00
" VIII, 1896.....	" 4.00	" XVI, 1902.....	" 5.00
" IX, 1897.....	" 4.75	" XVII, Part I, 1902..	" 1.50
" X, 1898.....	" 4.75	" " " II, "	" .75
" XI, Part I, 1898	" 1.25	" XVIII, " I, "	" 2.00
" " " II, 1899	" 2.00	" XIX, 1903.....	" 6.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued quarterly. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of from about 400 to 700 pages, and from about 25 to 60 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I.

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the Report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

PART VIII.—The Reptilian Subclasses Diapsida and Synapsida and the Early History of the Diaptosauria. By Henry Fairfield Osborn. Pp. 449–507, pl. xl, and 28 text figures. (With Contents and Index to Volume I.) November, 1903. Price, 2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

PART II.—The Basketry of the Tlingit. Pp. 229–277, pll. v–xviii, and 73 text figures. July, 1903. Price, $2.00.

(*Continued on 3d page of cover.*)

A New Sheep from Kamchatka.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XX, Article XXV, pp. 293–298.

New York, Sept. 8, 1904.

The Knickerbocker Press, New York

Article XXV.—A NEW SHEEP FROM KAMCHATKA.

By J. A. Allen.

The Museum has recently received from Mr. George H. Storck, a well-known fur-dealer and taxidermist of this city, two fine skulls of sheep from Kamchatka, representing two species, one being the *Ovis nivicola* and the other an apparently undescribed species. Both were obtained in that country personally by Mr. Storck, and their history is thus beyond question. The *nivicola* specimen was taken "between Milko and Petropavlovsk in southeastern Kamchatka"; the other "was taken about 110 versts east of Fort Tigil on the west side of Kamchatka." Mr. Storck adds: "I have seen several skulls up there, taken in that section, and they are all the same, that is the horns are thin at the base and have a double curve. . . . Specimens of this sheep are very hard to get, as they are found only in the central range of mountains in the northwestern portion of Kamchatka; and it is the most difficult place to travel in that I have ever faced, both on account of the roughness of the country and the almost constant storms that rage all through the winter, which is practically the only season when one can travel in the interior."

The Fort Tigil specimen is strikingly different from any previously described species, having somewhat the type of horns of *Ovis ammon*, but it is much smaller than any of the known forms of the *O. ammon* group. It may well bear the name of its discoverer and be called

Ovis storcki, sp. nov.

Type, No. 22689, an old male skull, from the mountains about 75 miles east of Fort Tigil, Kamchatka; collected and presented by George H. Storck, for whom the species is named.

Horns a close spiral, forming a circle and a half, curving first outward and downward, and then, at about the end of the first circle, inward, upward, and finally outward again. The frontal surface is finely ribbed transversely to the axis of curvature, with a sharp angle at both edges, continued nearly to the tip; the exterior ('orbital') and interior ('nuchal') surfaces meet so as to form a broadly rounded

Fig. 1. *Ovis storcki*, No. 22689, old male, from near Fort Tigil, Kamchatka. ⅛ nat. size.

Fig. 2. *Ovis nivicola*, No. 22690, old male, Southern Kamchatka. ⅛ nat. size.

LIBRARY OF THE UNIVERSITY OF

Fig. 3. *Ovis borealis* (?), No. 18212, old male, Taiganose Peninsula, N. E. Siberia. $\frac{1}{8}$ nat. size.

'nuchal edge,' very broad basally, but becoming thinner and sharper apically. As shown by the figures (Figs. 1 and 4), the spiral is very close; at the end of the first circle the horns approach the face just in front of the orbits so nearly as to be distant from the facial portion of the skull by only a space equal to the anteorbital breadth of the skull, and then sweep abruptly outward. The form of the spiral is thus similar to that seen in *O. ammon*.

Length of horn, measured along the frontal surface, 1015 mm. (40 in.); circumference at base, 295 ($11\frac{1}{2}$ in.); distance between tips, 605 ($23\frac{3}{4}$ in.); distance apart at point of greatest inward curvature (opposite molars), 225 ($8\frac{4}{8}$ in.); breadth of frontal surface at base, 80.

Skull, total length (front of premaxillæ to occipital crest), 280; basal length (premax. to posterior border of occip. condyles), 255; greatest breadth at posterior border of orbits, 168; palatal length, 125; post-palatal length (to basion), 110; palatal breadth at m^2, 47; mastoid breadth, 110; facial breadth above, m^2, 79; length of upper toothrow, 69; last upper molar, 20.3 x 12.5.

In the length and general character of the curvature of the horns there is a close resemblance between *O. storcki* and the skull of the Siberian Argali (*Ovis ammon*) from the Altai, figured by Mr. Rowland Ward in his 'Records of Big Game' (4th ed., 1903, p. 383), but the dimensions of the horns are

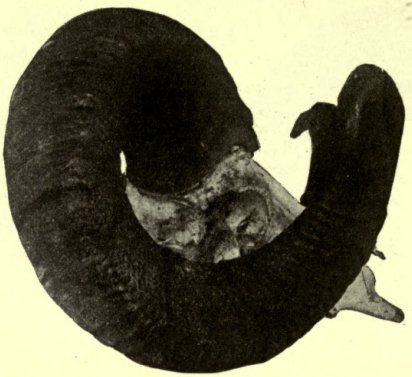


Fig 4. Same specimen as Fig. 1.

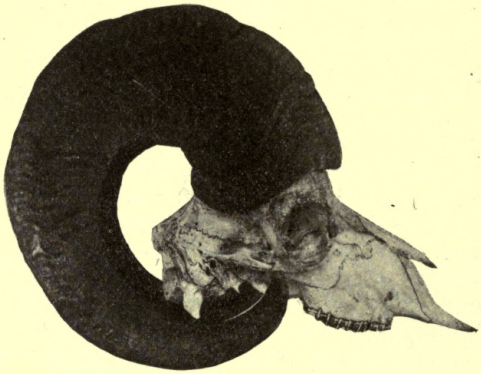


Fig. 5. Same specimen as Fig. 2.

Fig. 6. Same specimen as Fig. 3.

very much less, and they differ markedly also in the character of the basal portion, to say nothing of the wide geographical separation of the two species. In regard to the difference in size, while the skull of *O. storcki* is that of a very old animal, its measurements are fully one third less than those given for old Altai skulls of *O. ammon*.

While this species differs widely from any other hitherto recognized, it may be of interest to compare the general size of the skull with the skull of *O. nivicola* collected by Mr. Storck, the species which is the nearest geographical neighbor of *O. storcki*. In linear measurements there is very little difference, aside from the horns, between the two, but *O. nivicola* has the facial portion of the skull broader, with a broader and more arched palate, and the toothrows are curved instead of straight, as in *O. storcki*. The horns of *nivicola* are of course much shorter (740 against 1015), much heavier at the base (circumference 645 against 605, width of base of frontal surface, 100 against 80), and curve continuously outward instead of recurving inward, upward, and then outward again.

As of interest in this connection figures are given of a skull of *O. nivicola* (Figs. 2 and 5), and of one of the skulls (Figs. 3 and 6) obtained by Mr. Buxton on the Taiganose Peninsula (at the head of the Okhotsk Sea), referred by me first (this Bulletin, XIX, 1903, p. 130) to *O. nivicola* and later (*ibid.*, p. 196) to *O. borealis* Severtszoff (*O. canadensis borealis* Lydekker, P. Z. S., 1902, Vol. II, p. 85), but which is probably separable from true *borealis* of the Yana River region, a thousand miles to the northwestward of the Taiganose Peninsula. However this may be, these specimens show that three very distinct species of sheep occur in close proximity within the territorial limits of Kamchatka.

In answer to my inquiries about the occurrence of *white* bighorns in Kamchatka, Mr. Stork's reply is of interest, as he has traversed the whole interior of the peninsula, from north to south, on commercial expeditions for the purchase of sable and other furs. He says: " In reference to *white* mountain sheep, I do not believe that any exist in Kamchatka. I have

never seen or heard of any, or seen any fragments of skins. If there is such a sheep it must come from north of latitude 59°. That part of the country is never hunted; it is inhabited by wandering Koraks who live entirely on the reindeer, and never kill anything except wolves, and then only to protect their herds."

(*Continued from 4th page of cover.*)

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. Pp. 77–132. January, 1902. Price, $1.00.

PART IV.—Shell Heaps of the Lower Frazer River. By Harlan I. Smith. Pp. 133–190, pll. vi, vii, and 59 text figures. December, 1902. Price, $1.00.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 1–270. January, 1902. Price, $3.00.

PART II.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 271–402. December, 1902. Price, $1.50.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. Pp. i–xvi, 1–332, pll. i–viii (5 colored), and 19 text figures. May, 1902. Price, $5.00.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. January, 1902. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. i–xxviii. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.

Volume I, 1881–86	Price, $5.00	Volume XI, Part III, 1900	Price, $2.00
" II, 1887–90	" 4.75	" " " IV, 1901	" 1.75
" III, 1890–91	" 4.00	" " (Complete)	" 5.00
" IV, 1892	" 4.00	" XII, 1899	" 4.00
" V, 1893	" 4.00	" XIII, 1900	" 4.00
" VI, 1894	" 4.00	" XIV, 1900	" 4.00
" VII, 1895	" 4.00	" XV, Part I, 1901	" 3.00
" VIII, 1896	" 4.00	" XVI, 1902	" 5.00
" IX, 1897	" 4.75	" XVII, Part I, 1902	" 1.50
" X, 1898	" 4.75	" " " II, "	" .75
" XI, Part I, 1898	" 1.25	" XVIII, " I, "	" 2.00
" " " II, 1899	" 2.00	" XIX, 1903	" 6.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued quarterly. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of from about 400 to 700 pages, and from about 25 to 60 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I.

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the Report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

PART VIII.—The Reptilian Subclasses Diapsida and Synapsida and the Early History of the Diaptosauria. By Henry Fairfield Osborn. Pp. 449–507, pl. xl, and 28 text figures. (With Contents and Index to Volume I.) November, 1903. Price, 2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

PART II.—The Basketry of the Tlingit. Pp. 229–277, pll. v–xviii, and 73 text figures. July, 1903. Price, $2.00.

(*Continued on 3d page of cover.*)

New Mammals from Venezuela and Colombia.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XX, Article XXVIII, pp. 327–335.

New York, Oct. 8, 1904.

The Knickerbocker Press, New York

Article XXVIII. — NEW MAMMALS FROM VENEZUELA AND COLOMBIA.

By J. A. Allen.

Peramys brevicaudatus dorsalis, subsp. nov.

Type, No. 16126, ♂ ad., Ciudad Bolivar, Venezuela, Dec. 19, 1899; coll. S. M. Klages.

Three adults, taken at Ciudad Bolivar in December, have been compared with the type of *P. brevicaudatus orinoci* Thomas, from which they differ in the upper surface being dark brown instead of "pale grey," and the under surface deep buff instead of "pale buffy," the hairs dingy gray basally instead of "dark slaty."

The male type measures: Head and body, 219 mm.; tail vertebræ, 79; two adult females measure, respectively, 180 and 190 in total length; tail vertebræ, 67 and 69. The corresponding measurements for the type of *orinoci*, "a slightly immature male," are 111 and 75. Skull (type), basal length, 34 (in *orinoci*, 29); greatest breadth, 19 (17); nasals, 16 x 6.5 (14.5 x 5); m^1-m^3, 6.3 (5.8).

Doubtless the difference in size between the types of *dorsalis* and *orinoci* is somewhat due to difference in the age of the specimens, but the important color differences can hardly be owing to the same cause, since two young specimens from Suapure (March and December) are as dark on the back as the adults.

Oryzomys klagesi, sp. nov.

Type, No. 16966, ♂ (?), El Llagual, Venezuela, Feb. 19, 1901; coll. S. M. Klages, for whom the species is named.

Pelage full and long. General color above ochraceous rufous slightly varied with black-tipped hairs on the back, darker and less ochraceous on the facial portion of the head; decidedly dusky around the eyes and over front of nose; sides deep, uniform ochraceous from cheeks to rump; below buffy white, the basal portion of the fur gray; ears small, light reddish brown, nearly naked; upper surface of fore feet buff, of hind feet pale yellowish gray; tail about equal to length of head and body, pale brown, slightly paler below on the basal half, nearly naked except on the apical fifth, where fine short hairs nearly conceal the annulations and form a slight pencil at the tip.

Skull rather short (especially the rostral portion), broad and very flat, with an exceptionally broad and heavy supraorbital ledge, continued posteriorly to the interparietal as a strongly developed parietal

ridge; anterior palatine foramina relatively long and narrow, and narrow posterior nares.

Total length, 248 mm.; head and body, 127; tail vertebræ, 121; hind foot, 25 (without claws, 23); ear (from crown, dry), 12. Skull, total length, 32; basilar length, 25; zygomatic breadth, 17; interorbital breadth, 5.6; greatest width of braincase, 14; nasals, 10 x 6; palatal length, 14; palatine foramina, 6 x 2; upper toothrow, 5.

Oryzomys klagesi is not closely related to any species known to me. It is a robust form, with the tail rather shorter than the body, broad stout feet, rather small ears, and long soft pelage. The skull is broad and very flat, with a short, thick rostrum, and very heavy supraorbital ledges, although the teeth are almost unworn. In coloration it is remarkably like *O. speciosus* All. & Chap., from Trinidad, except for the darkening of the facial portion of the head. It is, however, a larger, more robust species, with much heavier and broader skull and shorter tail, and rather long and narrow instead of broad and short palatine foramina, and narrower posterior nares.

Oryzomys tenuipes, sp. nov.

Type, No. 21330, ♀, Merida (alt. 1630 m.), Venezuela, Feb. 14, 1903; coll. S. B. Gabaldon.

In texture of pelage and coloration similar to *O. stolzmanni* Thomas, from Huambo, northern Peru, but much smaller and more delicate, with much narrower and slenderer feet, relatively shorter tail, slenderer rostrum, and shorter posterior nares.

General color above dark brown, with a tinge of rufous; sides lighter and grayer with a slight fulvous tinge; lower parts buffy whitish; ears blackish externally on the anterior border, in contrast with the color of the surrounding parts; feet very narrow and slender, upper surface of the fore feet yellowish brown, of the hind feet buffy gray; tail pale brown, apparently naked but on close inspection showing minute hairs, increasing in abundance apically until near the tip they nearly conceal the annulations and form a slight pencil.

Total length, 180; head and body, 80; tail vertebræ, 100; hind foot (with claws), 22; ear, 12. Skull, total length, 22.5; basilar length, 17; zygomatic breadth, 11.4; greatest width of braincase, 10; interorbital breadth, 3.5; nasals, 7.2 x 2; palatine foramina, 4 x 1.3; palatal length, 8.5; upper toothrow, 3. Interorbital region flat, with an angular border and slight parietal ridges; palatine foramina terminating on a line with the front molars, posterior nares very short, posterior border of palate deeply hollowed, extending well beyond the

last molars; rostral portion of skull long and narrow; bullæ pointed internally and hence subpyriform.

The skull is that of a young adult; compared with that of *stolzmanni* it is much slighter and more delicate, and fully one third less in bulk. Compared with *O. gracilis* Thomas, also from Merida, the dimensions are considerably less, especially of the skull and feet, and the pelage is not "short and velvety," but rather coarse and long, and the coloration is quite different, especially of the ventral surface, which is buffy white instead of clear white. Two other specimens agree essentially with the type. All were caught in banana plantations.

Akodon meridensis, sp. nov.

Type, No. 21328, ♀, Merida (alt. 1630 m.), Venezuela, Jan. 29, 1903; coll. S. B. Gabaldon.

In proportions and coloration apparently similar to *A. bogotensis* Thomas, but slightly larger and very different in cranial characters. Whole upper surface a fine grizzle or 'pepper and salt' mixture of black and fulvous, the black greatly predominating; front and sides of head more decidedly yellowish; ventral surface dingy blackish gray with strong wash of deep buff; ears of medium size, well-haired, colored like the surrounding surface; tail blackish brown above, slightly paler below, thinly clothed with blackish hairs, not quite concealing the annulations; feet blackish brown with a slight yellowish cast.

Total length, 180 mm.; head and body, 100; tail vertebræ, 80; hind foot (c. u.), 25 (dry, 23); ear, 12. Skull, total length, 26; basal length, 22.5; basilar length, 19.5; greatest breadth, 13.5; nasals, 9 x 3; interorbital breadth, 5.1; interparietal, 6 x 2; breadth of zygomatic plate, 2; diastema, 7; palatal foramina, 5 x 2; upper toothrow, 4.4. The palatal foramina reach to the middle instead of to "the front edge" of m^1, as in *A. bogotensis.*

With a general external resemblance to *A. bogotensis*, including size and proportions, *A. meridensis* has not only longer and more posteriorly produced palatine foramina, but a broader muzzle, a much broader zygomatic plate, and a longer upper toothrow. To this same group belongs also *A. frustrator* All. & Chap., from Trinidad, there being a very close agreement in size, proportions, and coloration between *A. frustrator* and *A. meridensis*, although the coloration is

distinctly not the same, and there are very obvious cranial differences, *A. frustrator* having a much narrower and more pointed rostrum, and at the same time a much broader palatal fossa.

Lives in irrigating ditches, vicinity of Merida.

20. **Holochilus venezuelæ,** sp. nov.

Type, No. 16973, a half grown female, El Llagual, Venezuela, March 20, 1901; cotype, No. 16964, a very old male, same locality and date; coll. Samuel M. Klages.

Adult male: General color above reddish brown, strongly varied with black along the mid-dorsal region, from nose to lower back; lighter and more fulvous on the sides, and reddish fulvous on lower back and rump; below buffy gray, the hairs gray basally with yellowish white tips, which are deep buff on the longer hairs; ears, in size, shape, and hairiness, about as in *Nectomys palmipes;* feet thinly haired, grayish flesh-colored; claws whitish with a subapical dusky ring, and fringed with whitish hairs at the base; tail dark brown, not appreciably lighter below, with short black bristles, increasing in length and abundance apically, the terminal fifth of the tail being well clothed with blackish bristly hairs, quite concealing the annulations.

The young specimen is still partly in first pelage, the middle of the back being clothed with the soft woolly first coat, of a dull rusty brown color; flanks, from cheeks to thighs, clothed with the coarser, longer, firm pelage of the mature animal, bright rusty fulvous varied slightly with black-tipped hairs; ventral surface grayish white with a slight buffy tinge superficially and gray basally. Ears rather more hairy than in the adult, the tail much less so.

Measurements. — Adult male: Total length, 409 mm.; head and body, 203; tail vertebræ, 206; hind foot (from dry skin), 50; without claws, 47; ear from crown (in dry skin), 16.

This species differs from *H. guianæ* Thomas, from the Kanucha Mountains, British Guiana, its nearest geographical representative, in being very much larger and more rufous as well as somewhat in cranial details. Represented by two specimens, one a very old male with the enamel pattern of the teeth obliterated, the other a young female with wholly unworn teeth. For this reason the younger specimen is designated as the type, the unworn teeth showing it to be a *Holochilus* and not a *Nectomys;* but there is no doubt that the two specimens are young and adult of the same species.

Felis maripensis, sp. nov.

Type, No. 21308, ♂ ad., Maripa, Caura district, Venezuela, Dec. 7, 1901; coll. S. M. Klages.

Nape hairs directed forward. Ground color of upper parts deep tawny, nearly uniform over the whole dorsal region, the lower back and rump being scarcely paler than the neck and shoulders, but flanks slightly paler; whole upper surface heavily striped and blotched with black, the black greatly predominating over the lighter interspaces; the black markings are mostly solid, a few only, and these on the sides of the thoracic region, enclosing tawny areas, or forming rosettes; nape stripes five, very sharply defined, the middle one a narrow line, the outer pairs forming broad bands, 10 to 15 mm. wide, and extending from the top of the head to the shoulders; the narrow median stripe, except for slight interruptions at the shoulders, extends continuously to the base of the tail, with an average width of about 10 mm.; ventral surface and inside of limbs clear white, heavily blotched with black, which occupies fully half the area except on the lower abdomen; outer surface of limbs pale tawny, marked with small oval spots of black; ears externally black with the usual grayish white marginal spot; dorsal area of tail mostly black, broken by irregular cross lines of pale tawny, which divide into half rings of white on the sides and beneath.

External measurements (approximately from the softened skin): Total length, 1285 mm.; head and body, 935; tail, 350; ear, 48. The feet afford no measurements, they having been skinned out down to the toes.

Skull: Total length, 144; basal length, 130; basilar length (of Hensel), 121; zygomatic breadth, 90; breadth of rostrum at base of canines, 40; mastoid breadth, 57.5; width of braincase, 53; interorbital breadth, 27; postorbital breadth, 32.5; tip to tip of postorbital processes, 57; palatal length, 55; inner base of incisors to end of pterygoid processes, 78; width of palate at front of edge of p^3, 32; nasals very broad at anterior border, uniform wedge-shaped, 33 x 18.5; audital bullæ, 26.5 x 15; length of p^3 on outer border, 17.5; width of p^3, at front border, 9.5

Felis maripensis is a large, dark colored form of the *F. pardalis* group, but is very different from any of the Mexican or Central American forms, and from that of the Santa Marta district of Colombia. It is characterized by the deep uniform tawny ground color of the upper parts, which closely resembles that of the jaguar; the generally solid, very coarse black markings; and the very large size of the upper carnassial

tooth and the unusually great development of its internal tubercle.

It seems presumptuous to add a supposed new cat in the *Felis pardalis* group, but the present form differs so markedly from any of those hitherto described that there seems to be no other reasonable alternative. Most of the names given to members of this group rest on very unsatisfactory descriptions based on menagerie or other specimens from unknown localities. The present species is too large to belong to the *F. pardinoides* group, and is too deeply colored and otherwise too different to be referred to any of the recently recognized forms of the *F. pardalis* group. Its Colombian neighbor on the north is a pale form, with the ground color above pale fulvous gray, rather brighter on the anterior half of the body than posteriorly, fading out to buffy grayish white on the sides, and the black stripes and blotches are very narrow, enclose large areas of the ground color, and occupy only a relatively small portion of the dorsal surface. It is also much smaller, the total length of the skull being 117 mm. and the zygomatic breadth 76. It is, however, much larger than any member of the *F. pardinoides* group, and also has the nape hairs reversed, or directed forward. Being apparently undescribed it may be called *Felis sanctæmartæ*, as described below.

Felis sanctæmartæ, sp. nov.

Type, No. 14857, ♂ ad., Bonda, Santa Marta district, Colombia, March 25, 1899; coll. Herbert H. Smith.

Nape hairs reversed (directed forward). Ground color of upper parts pale grayish fulvous, stronger on head, neck, and shoulders, fading to much paler posteriorly, and to grayish white on the flanks, latter elongate and enclosing rather broad patches of pale fulvous, between the markings; black stripes and blotches very narrow, the with the intervening spaces on the sides grayish white; median nape stripe a narrow broken line of black, the outer stripes (two on each side) broad and well defined; the median black dorsal stripe is interrupted and discontinuous except for about 175 mm. along the middle region of the back; black head stripes broken posteriorly into small transverse blotches; cheek and throat stripes as usual but very narrow; ventral surface and inside of limbs white, spotted with black;

a large white ear spot; tail above blotched very irregularly with black on a dingy white ground, the black massed so as to form transverse bands of varying width on the apical third.

Total length (as measured by the collector), 927 mm.; head and body, 571; tail, 356; hind foot, 138. Skull, total length, 117; basal length, 108; basilar length (of Hensel), 101; zygomatic breadth, 76; breadth of rostrum at base of canines, 24; mastoid breadth, 50; width of braincase, 47; interorbital breadth, 21.5; postorbital breadth, 28; tip to tip of postorbital processes, 47; palatal length, 44; inner base of incisors to end of pterygoid process, 66; width of palate at front edge of p^3, 25; audital bullæ, 26 x 16.5; length of p^3 on outer border, 14; width of p^3 at front border, 8.

This is a very small form of the *F. pardalis* group, characterized by pallid coloration, small size, and large, evenly convex, greatly inflated bullæ. A second specimen, about half grown and still retaining part of the milk dentition, is similar in markings and all other particulars except that the coloration is a little brighter.

Procyon proteus, sp. nov.

Type, No. 23492, ♂ ad., Bonda, Santa Marta district, Colombia; coll. H. H. Smith.

Coloration very variable. Type: Median dorsal region, from nape to tail, blackish varied with yellowish, the hairs being broadly tipped with black and subapically broadly ringed with fulvous; flanks golden ochraceous; ventral surface ochraceous yellow; head blackish varied with fulvous gray; a broad black band across the rostrum extends back to the eyes, and passing backward encloses the eyes, covers a broad space beneath them, and continues posteriorly to the front base of the ears, where it sends a broad arm upward to join the black area of the forehead; a broad yellowish white superciliary band, and a small oval light median spot behind the eyes; muzzle, upper lip and chin pale yellowish white; basal two thirds of ears externally dusky, the apical third and inner surface dull yellowish, heavily haired; legs dusky on the outer surface and yellowish brown on the inner; upper surface of feet pale brown, near "broccoli brown"; tail yellowish brown, strongest basally and paler apically, with above about seven black rings, and a black tip, the basal rings incomplete below.

A second male specimen is paler throughout but otherwise similar. Four females are similar in color pattern, but the dorsal area is much blacker and suffused with gray instead of fulvous, with the light facial markings white, and the flanks and ventral surface much paler, the flanks being pale fulvous instead of orange, and the ventral

surface pale yellowish white instead of yellow. In these specimens the head, neck, shoulders, and anterior half of the dorsal region are strongly blackish suffused with gray; but the amount and conspicuousness of the gray suffusion vary greatly in the different specimens.

The collector's measurements of the type are: Total length, 1041 mm.; tail vertebræ, 356; hind foot, 159; ear, 76. The four females are smaller, averaging, total length, 952 (914–991); tail vertebræ, 316 (305–330); hind foot, 138 (137–146). Skull, type: Total length, 132; zygomatic breadth, 86; m^1–m^3, 25; m_1–m_3, 29. The females are smaller, averaging 118 by 81.

The type locality of *Procyon cancrivorus* is Cayenne, to which probably the Trinidad animal is referable. A comparison of this species with a Trinidad specimen leads to the conclusion that there is very little difference in size, and probably very little in coloration, taking into account the wide variability in this respect of the Santa Marta series. But there is a striking difference in the dentition of the two forms, through the great reduction in massiveness of the teeth in *P. proteus*. This is especially noticeable in the great length of m_3, which measures 13 x 7.5 in *P. cancrivorus* and 10.5 x 7.5 in *P. proteus*. The upper molar series has a length in *P. cancrivorus* of 28 against 25 in *P. proteus;* the difference is still greater in the lower molar series, which measures respectively 35.6 and 30. The premolar series is especially weak in *P. proteus*, being less than half as massive as in a Trinidad example of *P. cancrivorus;* the premolars are all separated by distinct diastemata in *P. proteus*, but in *P. cancrivorus* they are closely crowded, and in the lower jaw overlap on the alveolar line.

Nasua phæocephala, sp. nov.

Type, No. 17557, ♀ ad., Suapure, Caura district, Venezuela, Sept. 14, 1901; coll. S. M. Klages.

Front and sides of head gray tinged with blackish, without distinct facial markings of either black or white; top of head grayish fulvous; nape, shoulders, thoracic region, and side of body dingy reddish brown, more or less shaded with dusky; posterior half of dorsal region blackish slightly mixed with dark rusty brown hairs, the dark area passing forward on the median line in a point about to the shoulders; sides of breast and lower abdomen dull rusty fulvous; costal area dull rusty

brown like the flanks, the color of the upper parts encroaching upon the ventral surface and not sharply demarked; throat with the pelage dingy brown at base and tipped with grayish fulvous, becoming still lighter on the chin; proximal portion of limbs like the adjoining parts of the body; feet and apical part of limbs black; tail conspicuously ringed with black and pale fulvous,—about eight black rings and a black tip, the black rings about twice as wide as the light rings. Pelage coarse and harsh — not fine and soft as in *N. olivaceus meridensis.*

Total length (type), 814 mm.; head and body, 495; tail vertebræ, 319; hind foot (in dry skin), 82, with nails, 88; ear (dry), 26. Skull Total length, 121; basal length, 119; basilar length (Hensel), 103 zygomatic breadth, 60; interorbital breadth, 25; postorbital breadth, 26; mastoid breadth, 42; width of braincase, 43; nasals — (imperfect in type); incisors to pterygoid process, 81; upper toothrow (c–m^3). 46.5; middle molar (m^2), 7 x 7; audital bullæ, very convex anteriorly, 15 x 9. This skull is practically of the same size as female skulls of corresponding age of *N.* '*nasua*' from Chapada, Matto Grosso, Brazil, but the teeth are much larger, m^2 being 1 mm. larger in both diameters, and the bullæ are longer and narrower and more convex anteriorly.

This form of the *N. nasua* group appears to be well characterized by its gray head and the absence of facial markings, its coarse harsh pelage, general coloration, and heavy dentition. Represented by the type, an adult female, and a young but nearly adult male, both taken at Suapure on the same day. They agree very closely in all details of coloration.

(*Continued from 4th page of cover.*)

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. Pp. 77–132. January, 1902. Price, $1.00.

PART IV.—Shell Heaps of the Lower Frazer River. By Harlan I. Smith. Pp. 133–190, pll. vi, vii, and 59 text figures. December, 1902. Price, $1.00.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 1–270. January, 1902. Price, $3.00.

PART II.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 271–402. December, 1902. Price, $1.50.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. Pp. i–xvi, 1–332, pll. i–viii (5 colored), and 19 text figures. May, 1902. Price, $5.00.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. January, 1902. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. i–xxviii. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.

Volume I, 1881–86	Price, $5.00	Volume XI, Part III, 1900	Price, $2.00
" II, 1887–90	" 4.75	" " IV, 1901	" 1.75
" III, 1890–91	" 4.00	" " (Complete)	" 5.00
" IV, 1892	" 4.00	" XII, 1899	" 4.00
" V, 1893	" 4.00	" XIII, 1900	" 4.00
" VI, 1894	" 4.00	" XIV, 1900	" 4.00
" VII, 1895	" 4.00	" XV, Part I, 1901	" 3.00
" VIII, 1896	" 4.00	" XVI, 1902	" 5.00
" IX, 1897	" 4.75	" XVII, Part I, 1902	" 1.50
" X, 1898	" 4.75	" " " II, "	" .75
" XI, Part I, 1898	" 1.25	" XVIII, " I, "	" 2.00
" " " II, 1899	" 2.00	" XIX, 1903	" 6.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued quarterly. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of from about 400 to 700 pages, and from about 25 to 60 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I.

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the Report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

PART VIII.—The Reptilian Subclasses Diapsida and Synapsida and the Early History of the Diaptosauria. By Henry Fairfield Osborn. Pp. 449–507, pl. xl, and 28 text figures. (With Contents and Index to Volume I.) November, 1903. Price, 2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

PART II.—The Basketry of the Tlingit. Pp. 229–277, pll. v–xviii, and 73 text figures. July, 1903. Price, $2.00.

(*Continued on 3d page of cover.*)

17

List of Mammals from Venezuela, Collected by Mr. Samuel M. Klages.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XX, Article XXIX, pp. 337–345.

New York, Oct. 8, 1904.

The Knickerbocker Press, New York

Article XXIX. — LIST OF MAMMALS FROM VENEZUELA, COLLECTED BY MR. SAMUEL M. KLAGES.

By J. A. Allen.

During three years — 1900–1902 — Mr. Samuel M. Klages, a well-known entomological collector, collected birds and mammals for this Museum in Venezuela, incidentally to his other work. The collection of mammals, which forms the subject of the present paper, includes 275 specimens, representing 46 species. Some were collected in the immediate vicinity of Ciudad Bolivar, but the greater part at Maripa, Suapure, and other points in the Caura Valley.

1. **Marmosa klagesi** *Allen.* — Ciudad Bolivar, 3 specimens, 2 adult and 1 young, Oct. 26, Nov. 13, and Jan. 2; La Union, 3 specimens, 1 adult female and 2 young, May 4 and June 7. (See this Bulletin, XII, 1900, p. 198.)

2. **Marmosa mitis** *Bangs.* — Ciudad Bolivar, 1 specimen, Sept. 11. Indistinguishable from Santa Marta, Colombia, specimens.

3. **Marmosa murina** (*Linn.*). — Suapure, 1 specimen, Nov. 17.

4. **Peramys brevicaudatus dorsalis** *Allen.* — Ciudad Bolivar, 3 adults, taken in December, and 2 young from Suapure, March 25 and Dec. 15. (See this Bulletin, XX, 1904, p. 327.)

5. **Caluromys trinitatis leucurus** *Thomas.* — Ciudad Bolivar, skin and skull, adult male, Oct. 15; Suapure, skull only of a half-grown specimen, March 25.

6. **Metachirus nudicaudatus** (*E. Geoffroy*). — Maripa, 1 specimen, adult female, Feb. 28.

7. **Didelphis marsupialis** *Linn.* — Ciudad Bolivar, 1 specimen, a female about one third grown, Jan. 11.

8. **Bradypus tridactylus flaccidus** (*Gray*). — Nine specimens, collected as follows: Ciudad Bolivar, 3 specimens, 2 of which are adult females and the other a young female about one third grown, Jan. 25 and Feb. 6; Suapure, 4 specimens, 3 adult females and a young female, Sept. 11, Oct. 20, and Feb. 17;

Maripa, 2 specimens, adult female and young, Dec. 28, and Jan. 30.

No. 16135, ♀ ad., the whole front and sides of the head are covered with erect, stiff, bristly hairs, very different from the coarse, long, soft hairs of the rest of the pelage. These hairs are shorter on the face in front of and around the eyes, longer and stiffer over the top of the head, and still longer and less rigid on the sides of the head, neck, and throat. The coloration of the 'mask' is peculiar, being yellowish white on the front border, passing into golden ochraceous over the top and sides of the head and on the throat, enclosing a large circular area of ferruginous chestnut on the side of the head behind the eyes. There is also a narrow blackish eyering and a short, well-defined blackish postocular stripe. Top of head and nape, back to shoulders, blackish brown; rest of upper parts mixed blackish brown and dull soiled grayish white, which coloration extends onto the outer surface of the limbs; rump yellowish gray, unmixed with blackish; ventral surface and inside of limbs lighter than sides — dingy gray with less admixture of dusky hairs. A median black line is continued back over the shoulders from the nape, with a yellowish white stripe on each side. The hairs of the front part of this black dorsal band are much finer and softer than those of the general pelage, and the woolly underfur of the adjoining whitish bands is suffused basally with a golden tint. Claws white at tip, the basal two thirds yellowish.

No. 16136, ♀ ad., Feb. 6, is similar but the colors in general are everywhere paler, with the light colors prevailing over the dark tints. There is, however, a general difference in the character of the dorsal patch, which is sharply defined by the different character of the hair as well as by its strikingly contrasting colors. This patch has a length of 70 mm. by a width of about 35 (as measured from the dry unfilled skin), and is long oval in outline. The hair, evidently new, is short and stiff, like that on the mask, being only about 10 mm. in length, in striking contrast with the adjoining loose flaccid hairs 30–50 mm. long. The patch is divided by a median band of deep black, varying in width from 7 to 20 mm., being widest anteriorly and narrowest in the middle, and flanked on either side by a much wider band of ochraceous orange.

No. 16134, ♀ juv. (about one third grown), Jan. 25. This closely resembles in coloration and texture of pelage No. 16135, but the tints are paler, and the hair rather softer.

The 6 adults of this series, all sexed by the collector as females, vary greatly in the color of the dorsal surface, some being much lighter than others, with the dark color arranged in irregular patches. Three of them have the bright-colored,

conspicuous, chestnut and black post-interscapular patch of short stiff hair described above under No. 16136; two are quite without any such differentiation of the color and texture of the hairs of this region, while the other has the black hairs on this area shorter and softer than those of the adjoining pelage. Apparently, therefore, the presence or absence of this highly differentiated patch is not sexual, nor does it appear to be seasonal, as those with the patch were collected, respectively, Sept. 11, Jan. 30, and Feb. 6, while those without it were taken, respectively, Oct. 20, Dec. 30, and Jan. 25. It may, however, have some relation to the period of reproduction, which seems to vary with the individual, since a half-grown young was taken Dec. 28, and two others much younger were collected, respectively, Jan. 25 and Feb. 17.

These specimens are presumed to be referable to *Arctopithecus flaccidus* Gray (P. Z. S., 1849, p. 72, pl. xi, fig. 1), the type of which is the Dyson specimen from Venezuela, afterwards renamed *Arctopithecus flaccidus*, var. 1, *dysoni* by Gray in 1869 (Cat. Carn., Pachy., and Edent. Mamm., 1869, p. 365), and still later (1871) *Bradypus columbicus* by Fitzinger.

9. **Cholœpus didactylus** (*Linn.*). — La Union, 1 specimen, adult female, June 2.

10. **Cyclopes didactylus** (*Linn.*). — Ciudad Bolivar, 1 specimen, female, Aug. 10; San Ecidro, 2 specimens, male and female, Feb. 6.

11. **Tamandua longicaudata** (*Wagner*). — Five specimens, collected as follows: El Llagual, 1 specimen, May 7; Suapure, 1 specimen, Feb. 8; Maripa, 3 specimens, Nov. 30 and Jan. 18.

These five specimens of the Yellow Tamandua are very different in cranial characters as well as in coloration from the common *Tamandua tetradactyla*, and show beyond question that the species is well-founded, although the tail is not "nearly double the length of the body," as stated by Turner (P. Z. S., 1851, 218), the relative length of the tail to the body being apparently about the same as in *T. tetradactyla*, as given by Wagner (Suppl. Schreber's Säug., IV, 1844, p. 210). The ears, however, are much longer and larger.

Four of these specimens show no trace of the dark color

markings of the common tamandua, the coloration being nearly uniform yellowish brown, but varying from light straw color to much darker in different individuals. In the other specimen the nape, shoulders, and middle of the body all around are dusky with the tips of the hairs yellow, and a narrow median line of yellow extending from the shoulders to the hips. This specimen strongly suggests the color pattern of the common tamandua. The skull is larger than in *T. tetradactyla*, with the rostral portion slenderer and relatively longer, and the nasals are not abruptly expanded at the posterior border, as is usually the case in *T. tetradactyla*.

All the specimens of *Tamandua* sent by Mr. Klages are of the *T. longicaudata* type.

12. **Myrmecophaga tridactyla** *Linn.* — Ciudad Bolivar, 1 specimen, skin and skull, Jan. 7; Maripa, 2 specimens, — skeleton, Dec. 5, and skin and skull, Nov. 26.

13. **Mazama rufa** (*F. Cuvier*). — Three specimens: 2 adult females, Maripa, July 8 and Aug. 21; a young male, Suapure, Aug. 21.

14. **Sciurus flammifer** *Thomas.* — Thirteen specimens, collected as follows: Suapure, 5 specimens, Feb. 14 and 15; El Llagual, 2 specimens, March 18 and 20; La Union, 6 specimens (topotypes), Oct. 18.

The 5 Suapure specimens and one of the 6 La Union specimens are in the normal pelage of the type; the 2 El Llagual specimens and 5 of the La Union specimens are melanistic. In one of these the ventral surface is white; in another the hairs of the ventral surface are dusky at base and conspicuously tipped with white; in all the others the ventral surface is dusky, tinged with chestnut in two. There are traces of the orange-rufous lateral line in several of the melanistic specimens. The normal specimens are all white-bellied.

15. **Sciurus æstuans gilvigularis** (*Wagner*). — Six specimens: Suapure, 4 specimens, Feb. 6–13 and Sept. 16; La Union, 1 specimen, Oct. 21; El Llagual, 1 specimen, March 23. The September and October specimens are much deeper orange buff below, and more of a reddish cast above than the

February and March examples, from practically the same localities.

I am unable to satisfactorily distinguish these specimens from Santarem examples of *S. gilvigularis*.

16. **Mus alexandrinus** *Geoffroy.* — One specimen, Ciudad Bolivar.

17. **Oryzomys klagesi** *Allen.* — One specimen, El Llagual, Feb. 19. (See this Bulletin, XX, 1904, p. 327.)

18. **Sigmomys alstoni** (*Thomas*). — El Llagual, 1 specimen, adult female, March 2.

19. **Zygodontomys stellæ** *Thomas.* — El Llagual, 5 specimens (2 males, 3 females), all adult, March 12–23.

These specimens agree well with the description of *Z. stellæ* except as regards some of the external measurements, namely, "head and body, 110 millim.; tail, 38." But, "Tail about equal to the body without the head" is also not in harmony with these proportions. The description otherwise, including the dimensions of the skull, etc., agrees with the present series. The collector's measurements are: Head and body, 2 males, 133, 148; 3 females, 118–127; tail vertebræ, 2 males, 102, 108; 3 females, 83–98; average for the whole series, 130, 98. Skull, total length, 29–31. Although all are adult, the larger specimens, with the teeth greatly worn, are much older than the smaller examples.

20. **Holochilus venezuelæ** *Allen.* — El Llagual, 2 specimens, a very old male and a half-grown female, March 20. (See this Bulletin, XX, 1904, p. 330.)

21. **Proechimys cherriei** (*Thomas*). — Seven specimens, El Llagual, March 18–23.

22. **Dasyprocta lucifer** *Thomas.* — One specimen, an adult male, El Llagual, March 14. Head and body, 520 mm.; tail, 32; skull, greatest length, 115; zygomatic breadth, 51.

23. **Felis onca** *Linn.* — One specimen, Maripa.

24. **Felis maripensis** *Allen.* — One specimen, adult male, Maripa, Dec. 7. (See this Bulletin, XX, 1904, p. 331.)

25. **Canis (Thous) cancrivorus** *Desmarest.* — Two specimens, adult male and female, Suapure, Feb. 9.

Mr. Klages's collection contains 5 specimens of *Canis* of the

cancrivorus group, two of which are from Suapure and three from Maripa. The Suapure specimens are larger (on the basis of the skulls) and grayer than the Maripa animals, with much less rufous suffusion. These, in the absence of Guiana specimens for comparison, I provisionally refer to the coast form, *cancrivorus*. They are gray above, heavily varied with black along the middle of the back and upper surface of the tail, with little buffy suffusion, even of the underfur, and this mainly restricted to the sides of the neck, below and behind the ears; below buff, paler on the breast and inguinal region; chin blackish, the black extending back for 175 mm.; limbs yellowish buff, strongest on the sides and washed with blackish on the anterior surface. Total length, ♂ 958; ♀ 933; head and body, ♂ 660, ♀ 635; tail vertebræ, ♂ 298, ♀ 305; hind foot (approximate from dry skin), ♂ 144 (with claws 150), ♀ 144 (with claws 150); ear (dry), ♂ 62, ♀ 60. Skull, total length, ♂ 148.5, ♀ 145.5; basal length, ♂ 139, ♀ 138; zygomatic breadth, ♂ 82, ♀ 77.

The other three specimens agree well with the description of *Canis cancrivorus savannarum* Thomas, except that they are a little larger; they are provisionally referred to that form, as follows:

26. **Canis (Thous) cancrivorus savannarum** *Thomas.* — Three specimens, two adult males, Maripa, Dec. 24 and 29, and a half-grown female, Maripa, Aug. 1.

The December specimens are in greatly worn pelage, the long hairs on the back in one of the specimens and on the tails in both being greatly worn. In fresh pelage the whole back from the shoulders posteriorly is evidently strongly varied with black, as in the Suapure specimens. The underfur is strongly instead of faintly suffused with buff, brightening to orange buff on the neck, including the region of the ears and top of the head; pectoral region, insides of limbs, and the tail (except median line above), also deep orange buff; the rest of the ventral surface deep buff. Even the surface color on the sides of the neck and the area surrounding the ears is deep rusty buff.

As already said, these specimens are smaller than those

from Suapure, of corresponding sex and age, and besides being markedly different in coloration, m^2 is disproportionately smaller and less produced internally. The adult specimens respectively measure: Total length, 965, 973; head and body, 686, 668; tail, 279, 305; hind foot (approximately from dry skin), 140 (with claws 150), 140 (with claws 148); ear (dry), 50, 48. Skull, total length, 137, 134; basal length, 129, 130; zygomatic breadth, 76, 74. These measurements being of males naturally exceed those given of the female type of *savannarum*.

Canis aquilus (= *Urocyon aquilus* Bangs), from the coast region of Colombia, while strongly resembling externally the present group, differs from it in the skull being relatively broader and shorter with rather heavier dentition. While specifically distinct from *C. cancrivorus* it has only the most remote relationship to the genus *Urocyon*, which is suggested only by its coloration and coarse pelage.

27. **Tayra barbara** (*Linn.*). — Suapure, 2 specimens, Feb. 9 and 13.

28. **Nasua phæocephala** *Allen*. — Two specimens, adult female and young adult male, Suapure, Sept. 14. (See this Bulletin, XX, 1904, p. 334.)

29. **Myotis nigricans** (*Wied*). — Forty specimens, Maripa, Dec. 10–23.

30. **Proboscidea naso** (*Wied*). — Seven specimens, Maripa, Dec. 7–11, and Mato River, Feb. 24.

31. **Saccopteryx bilineata** (*Temm.*). — One specimen, Suapure, April 20.

32. **Myopterus planirostris** (*Peters*). — Two specimens, Maripa, Dec. 9 and 10.

33. **Molossus obscurus** *E. Geoffroy*. Seventy-five specimens, — 25 from Cuidad Bolivar, Sept. 30–June 26; 50 from Suapure, December.

34. **Molossus pretiosus** *Miller*. — Twenty-four specimens, — 13 from Ciudad Bolivar, Sept. 27–Oct. 13; 11 from Suapure, April 15.

35. **Promops barbatus** *Allen*. — One specimen, La Union, Caura district, Sept. 27. (See this Bulletin, XX, 1904, p. 228.)

36. **Dermanotus suapurensis** *Allen.* — One specimen, Suapure, Oct. 26. (See this Bulletin, XX, 1904, p. 229.)

37. **Lonchophylla thomasi** *Allen.* — One specimen, Ciudad Bolivar, Jan. 26. (See this Bulletin, XX, 1904, p. 230.)

38. **Micronycteris megalotis** (*Gray*). — One specimen, Ciudad Bolivar, Oct. 18.

39. **Hemiderma perspicillatum** (*Linn.*). — Two specimens, Ciudad Bolivar, May 20 and October 23.

40. **Phyllostomus hastatus** (*Pallas*). — Twelve specimens, — 1 from Cuidad Bolivar, Oct. 16; 11 from Suapure, April 15, of which 7 are young, about one half to two thirds grown, still retaining some of the milk incisors. They are all in young pelage, and all are very dark brown, or blackish brown.

41. **Phyllostomus discolor** *Wagner.* — Two specimens, Ciudad Bolivar, August 12, and Suapure, Nov. 17.

42. **Artibeus planirostris** (*Spix*). — Two specimens, Ciudad Bolivar, May 25 and September 2.

43. **Uroderma bilobatum** *Peters.* — Three specimens, 1 from Ciudad Bolivar, Sept. 27; 2 from Suapure, Nov. 17.

44. **Sturnira lilium** (*E. Geoffroy*). — Two specimens, Suapure, April 15, and Maripa, Dec. 9.

45. **Ateles belzebuth** *I. Geoffroy.* — One specimen, La Union, Caura district, Aug. 15 — an old female with greatly worn teeth.

46. **Cebus fatuellus** (*Linn.*). — Four specimens, of which 1 is from Suapure, taken Oct. 26; 1 from La Union, Oct. 9; 1 from El Llagual, March 12; and 1 from Maripa, April 21.

These four specimens well sustain the reputation of this species for variability, no two of them being very nearly alike.

The Suapure specimen (Oct. 26) is an old male in excellent pelage, with well developed lateral crests or 'horns'; and the hair of the flanks is very long. It has the top of the head deep brownish black; the nape, shoulders, and front half of the back dark brown with the tips of the hairs yellowish brown; lower back and rump dark reddish brown with the tips of the hairs yellowish rufous, making this tint the prevailing shade; limbs externally yellowish brown, with the upper surface of the feet and hands blackish brown; throat pale yellowish; sides of face yellowish gray; ventral surface chestnut rufous; inside of shoulders and inside of upper arms rusty yellow;

UNIVERSITY OF CALIFORNIA

inside of thighs strongly reddish brown; tail yellowish brown, darker apically, the hairs individually being blackish brown for most of their length and broadly tipped with yellowish gray.

Another old male from El Llagual (March 12) has the pelage considerably worn, and perhaps for this reason presents only a tendency to lateral crests—more so on one side than on the other—which apparently had been either shed or worn away. The general coloration of the dorsal surface, tail, and outside of limbs is very similar to that of the Maripa specimen, but the light tips of the hairs are paler, more yellowish, and less rufous. The ventral surface, however, is quite different, the remaining hairs of the breast and abdomen (which are nearly naked) being brown with a slight reddish cast, while the shoulders and upper arms are pale buff instead of rusty yellow.

An old female from La Union (Oct. 9) is in good pelage but lacks the lateral crests. The crown and middorsal region from nape to tail are brownish black with a slight rufescent tinge, the hairs very slightly tipped with dull rusty yellow. The under surface is about as in the La Union specimen, with the buffy tints several shades stronger.

An old female from Maripa (April 21) is in very worn pelage and evidently much faded, the light color on the sides of the face and chin being soiled grayish white and on the shoulders and upper arms very pale buffy white. The dark color on the top of the head forms a wedge-shaped median band, beginning as a mere line and widening gradually as far back as the ears where it occupies about two thirds of the interaural space.

The collector's external measurements are as follows:

16930, old ♂,	Suapure;	head and body,	445;	tail vertebræ,	496,
16929, ad. ♂,	El Llagual;	"	"	445;	"	"	508.
17559, old ♀,	La Union;	"	"	425;	"	"	572.
16931, ad. ♀,	Maripa;	"	"	381;	"	"	406.

The skulls, while all adult, vary much in age, No. 16930 being a very old male, and also in size, as follows:

16930, old ♂,	total length,	102;	zygomatic breadth,	66.
16929, ad. ♂,	"	"	93;	"	"	60.
17559, old ♀,	"	"	89;	"	"	59.
16931, ad. ♀,	"	"	87;	"	"	55.

(*Continued from 4th page of cover.*)

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. Pp. 77–132. January, 1902. Price, $1.00.

PART IV.—Shell Heaps of the Lower Frazer River. By Harlan I. Smith. Pp. 133–190, pll. vi, vii, and 59 text figures. December, 1902. Price, $1.00.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 1–270. January, 1902. Price, $3.00.

PART II.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 271–402. December, 1902. Price, $1.50.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. Pp. i–xvi, 1–332, pll. i–viii (5 colored), and 19 text figures. May, 1902. Price, $5.00.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. January, 1902. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. i–xxviii. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.

Volume I, 1881–86.....	Price, $5.00	Volume XI, Part III, 1900,	Price, $2.00
" II, 1887–90.....	" 4.75	" " " IV, 1901	" 1.75
" III, 1890–91.....	" 4.00	" " (Complete)...	" 5.00
" IV, 1892.....	" 4.00	" XII, 1899.....	" 4.00
" V, 1893.....	" 4.00	" XIII, 1900.....	" 4.00
" VI, 1894.....	" 4.00	" XIV, 1900.....	" 4.00
" VII, 1895.....	" 4.00	" XV, Part I, 1901..	" 3.00
" VIII, 1896.....	" 4.00	" XVI, 1902.....	" 5.00
" IX, 1897.....	" 4.75	" XVII, Part I, 1902..	" 1.50
" X, 1898.....	" 4.75	" " " II, "	" .75
" XI, Part I, 1898	" 1.25	" XVIII, " I, "	" 2.00
" " " II, 1899	" 2.00	" XIX, 1903.....	" 6.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued quarterly. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of from about 400 to 700 pages, and from about 25 to 60 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I.

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the Report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

PART VIII.—The Reptilian Subclasses Diapsida and Synapsida and the Early History of the Diaptosauria. By Henry Fairfield Osborn. Pp. 449–507, pl. xl, and 28 text figures. (With Contents and Index to Volume I.) November, 1903. Price, 2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

PART II.—The Basketry of the Tlingit. Pp. 229–277, pll. v–xviii, and 73 text figures. July, 1903. Price, $2.00.

(*Continued on 3d page of cover.*)

The Tamandua Anteaters.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XX, Article XXXIII, pp. 385–398.

New York, Oct. 29, 1904.

The Knickerbocker Press, New York

Article XXXIII. — THE TAMANDUA ANTEATERS.

By J. A. Allen.

The Tamanduas have a wide geographical distribution, extending throughout the warmer parts of America, from Paraguay to southern Mexico. They likewise vary greatly in size and coloration, but as a rule have all been referred, up to about 1889, to a single species, the *Myrmecophaga tetradactyla* of Linnæus, the *Tamandua tetradactyla* of recent authors, with the exception of the so-called Long-tailed Tamandua (*Tamandua longicaudata* Wagner), which differs markedly from the others in coloration and in the structure of the nasals, but not in the length of the tail, as the name erroneously implies. It is nearly uniform straw-color, thus lacking the peculiar pattern of coloration which characterizes the *T. tetradactyla* group, and stands sufficiently by itself (see this Bulletin, XX, 1904, p. 339) to be omitted from the present consideration.

A few other names may be assigned at once as synonyms of *tetradactyla*. These are: (1) *Myrmecophaga nigra* Desm. (ex Geoffroy MS.) Nouv. Dict. d'Hist. Nat., nouv. éd., XII, 1817), wholly black and probably a melanism; (2) *Myrmecophaga bivittata* Desm. (ex Geoffroy MS., *l. c.*), adopted by J. E. Gray in 1865 in place of *tetradactyla*.

In 1873, Gray (Hand-List of Edentate, Thick-skinned, and Ruminant Mammals, 1873, p. 27) gave names to two "varieties" of his *Tamandua bivittata* — "Var. 1. *Opisthomelas*," with the hinder part of the back black; and "Var. 3. *Opistholeuca*," with the hinder part of the back white. The first is from "Brazils," the other from Guatemala, Costa Rica, Ecuador, Brazils, etc. Both appear to have been ignored by subsequent writers. In 1899, Cope (Amer. Nat., XXIII, Feb., 1889, p. 132) based the name *Myrmecophaga straminea* on a single skin, the label of which had been lost, but which came either from the west central part of Rio Grande do Sul or Chapada, Matto Grosso, Brazil, — regions quite remote and zoölogically quite different. In the same paper he

founded the name *Myrmecophaga sellata* on a skin brought from Honduras to the World's Exposition at New Orleans. As will be shown later, neither of these names is at present entitled to serious consideration.

A series of nearly 60 specimens from the Santa Marta district of Colombia (nearly all taken at Bonda) affords ample material for the study of individual variation, not only in coloration but in size and cranial characters. The results of an examination of this material will be first recounted, and afterwards material from other localities will be considered.

An average Santa Marta specimen of the *T. tetradactyla* group is dark brown and yellowish white, the two colors generally arranged in sharply defined areas. A dark band (sometimes quite distinct) encloses the eye and extends forward to the side of the nose. A second very large dark area completely encircles the body, covering the ventral surface from the posterior border of the pectoral region to the base of the tail, the sides of the body, and the back from the shoulders to the lumbar region. It is usually divided for some distance down the middle of the back by a line of yellowish white extending from the shoulders posteriorly. From the dark area of the back a broad band of the same color runs forward and downward over the shoulders to the front border of the axillæ. The light-colored parts form two distinct areas wholly separated by the black of the body. The first covers the head and neck all around, the top of the shoulders, from which a V-shaped line extends down the middle of the back, and the whole of the fore limbs. The second light area includes the haired portion of the tail and the hind limbs, except the inside of the thighs, and extends forward more or less upon the rump and lower back.

This general type is endlessly modified, in specimens from the Santa Marta district, through individual variation, it being exceptional to find two specimens closely similar. These modifications affect the pattern of markings as well as the general tone of the coloration. The following are some of the principal variations.

VARIATION IN PATTERN. — *The Dark Areas.* — (1) The dusky eye-stripe is generally not strongly differentiated from the surrounding parts; it varies from a narrow dusky line, barely enclosing the eyes posteriorly, to a much broader indistinct band extending back to the base of the ears.

(2) The band encircling the body varies in antero-posterior extent, usually reaching, on the dorsal surface, from the posterior part of the shoulders to a little beyond the hips, and on the ventral surface from the posterior part of the pectoral region to the base of the tail, and over the proximal half of the inner surface of the hind limbs. Its posterior extension varies between wide limits, it sometimes only reaching to the line of the hips, and again extending to, and even somewhat upon, the base of the tail. These extremes cover, respectively, Gray's "var. *opisthomelas*" and "var. *opistholeuca.*" Anteriorly, if we include the shoulder bands, the variation is much greater. These may be very narrow or very broad, ranging in width from 10 to 40 mm. at their narrowest point. They usually are wider anteriorly than at the middle, but sometimes gradually diminish in width as they proceed forward, thus tapering anteriorly instead of widening to twice their mid-diameter.

The Light Areas. — The light areas of course vary conversely with the extent of the dark areas. But a special variation consists in the extent of the light median dorsal line. This, in a few specimens, is entirely absent; in a few others it extends the whole length of the back, completely dividing the dorsal black area into halves. Usually it is a broad, symmetrically wedge-shaped mark, extending back from the nape to enclose the hair-whorl at the withers, and then, abruptly narrowing to a width of about 15 mm., continues posteriorly, with constantly diminishing breadth, to the point of disappearance. It varies in width, when present, from a sharply defined conspicuous band to obsolescence, when it is merely indicated by an irregular line of scattered whitish hairs. In several specimens there is not only no trace of a median dorsal light line, but the whole of the interscapular area and nape are dusky, only a little less dark

than the shoulder bands, which are thus internally obscurely defined.

Variation in Color. — The light and dark areas not only vary in extent and form, as above described, but in color. The dark areas vary in tone from light reddish brown, or brownish rufous, to clear black, the average condition being dark brown. The posterior border of the dark area on the back is sometimes sharply defined, and sometimes shades off gradually into the light color of the rump. This is due to the hairs being dark basally at the edge of the white area and light apically, and the transition is either abrupt or gradual, according to the extent of the junctional area covered by light-tipped hairs. Also there are not infrequently light-tipped hairs on the back and sides of the body within the dark area, giving a superficial yellowish-gray wash to the surface, as is commonly the case in one-fourth- to half-grown young.

The light areas vary from nearly clear white (several specimens) to deep rusty yellow. The nuchal region is generally much deeper colored than the limbs and tail. In an average specimen the light parts are yellowish white or pale buffy, shading to ochraceous buff, or even ochraceous on the nuchal region.

Skulls. — The skulls are found to be remarkably constant in their characters. A series of 24 adult skulls selected at random for study shows that the skull varies very little individually, or with age. It is smooth or wholly without crests or ridges, even in old age. A young adult skull is distinguishable from a very old skull only by the comparative obsolescence of the sutures and the denser structure of the bone in the latter. The variation in size is not great, as is shown by the subjoined table of measurements (p. 397), which includes measurements of young adult, middle-aged, and old skulls. One specimen (No. 23423) is noticeably different from the others in being unusually short and broad, with an unusual convexity of the interorbital region. Another (No. 14675) differs in the rostral portion of the skull being unusually narrow and deep. The nasals vary in depth and

outline, especially in the outline of the posterior border, which is usually convex posteriorly, but may be square, or even slightly emarginate. They are usually slightly narrower near the middle than at the front border, and expand abruptly at their extreme postero-lateral border, varying from this general form only slightly in different individuals. The constancy of the skull characters is thus in strong contrast with the extreme variability of the coloration.

Having passed in review the large Santa Marta series we may take up the scanty material available for examination from other localities, namely, Chapada, Brazil (6 skulls and 1 skin), Chiriqui, Panama (4 skulls and 4 skins), and Passa Nueva, State of Vera Cruz, Mexico (5 skulls and 6 skins), and single specimens from elsewhere,

(1) The Chapada series of skulls stands apart from all the others in (*a*) the relative shortness of the nasals, due mainly to the great anterior extension of the frontals, which thus gives a short rostrum; and (*b*) in the greater posterior extension of the occipital condyles beyond the plane of the occiput, as expressed in the tables of measurements[1] given beyond. In this series the basal length of the skull slightly exceeds the occipito-nasal length, while in all the specimens from elsewhere it is considerably less. (*c*) The braincase is also flatter or much less convex, both antero-posteriorly and transversely, than in the skulls from other localities.

(2) The Santa Marta series differs from the Chapada series in all the points above specified, and from this and all the other series by much smaller size, the skulls averaging one tenth less than those from any other locality, with correspondingly smaller external dimensions, as will be shown beyond. The average occipito-nasal length of the skull is only 118 mm. against 131 in Chiriqui specimens, and the total length of the

[1] In this connection it should be explained that in all cases the basal length is taken from the posterior border of the occipital condyles to the front border of the maxillaries, for the reason that in most museum skulls the premaxillaries have either been wholly lost or are detached from the skull, with which in life their connection is merely ligamentary. They can be preserved attached to the skull only by the greatest care in its preparation; and then they are liable to become separated later, even with careful handling; and the same is true of the malar bone.

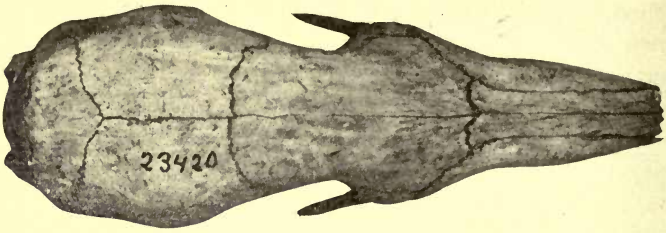


Fig. 1. *Tamandua tetradactyla instabilis*, Bonda, Colombia. ¾ nat. size.

Fig. 2 *Tamandua tetradactyla chapadensis*, Chapada, Matto Grosso, Brazil. ¾ nat. size.

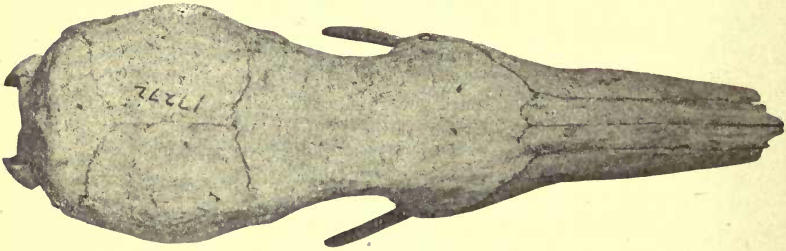


Fig. 3. *Tamandua tetradactyla tenuirostris*, Passa Nueva, Vera Cruz, Mexico. ¾ nat. size.

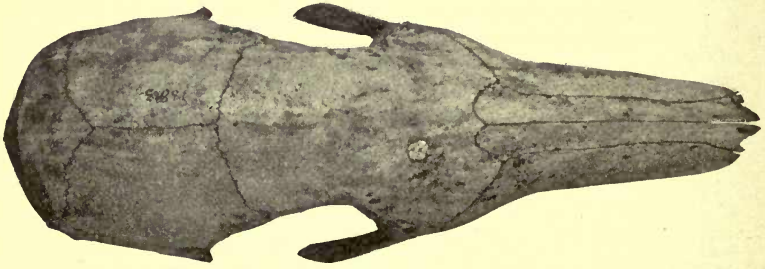


Fig 4. *Tamandua tetradactyla chiriquensis*, Boqueron, Chiriqui, Panama. ¾ nat. size.

animal in the flesh is 957 mm. against 1155 in the Chiriqui form.

(3) The distinguishing feature of the Vera Cruz skulls is the narrowness of the whole preparietal portion of the skull in comparison with any of the other forms, the braincase being of about the usual width but flat, with the interorbital and preorbital portions of the skull, especially the latter, slender and tapering. It shares in a measure the backward position of the occipital condyles with the Chapada form.

(4) The Chiriqui skulls are the largest of all. The braincase is relatively narrow, in comparison with the anteorbital region, and also very convex antero-posteriorly in contrast with the depressed and very flat frontal region. The occipital condyles are anterior in position, in strong contrast with the Chapada and Vera Cruz forms. The great length of the rostrum distinguishes it also from the Chapada and Santa Marta types, from which latter it further differs in its large size.

With these four series of skulls before one for comparison, the differences *inter se* are impressive and important (see Eigs. 1–4), though hard to express adequately in descriptions. They certainly indicate that the Tamandua group of Ant-eaters is subject to a degree of local variation, at least in the skulls, entitled to recognition. Although some of the forms, and possibly all, are subject to a wide range of individual variation in color, there are still other features by which they, and doubtless other forms, can be separated.

In view of the apparent continuity of the distribution of the group, it seems best to treat the local forms above indicated as merely subspecies. As a starting-point, it seems proper to take Guiana as the type locality of the Linnæan *Myrmecophaga tetradactyla*, since it was based on the accounts of early writers whose material or observations were made either in the Guianas or in "Brazil." It is at least following the precedents established in similar cases to accept Guiana as the type locality for *tetradactyla*.

Tamandua tetradactyla chapadensis, subsp. nov.

Fig. 2, p. 390.

Myrmecophaga bivittata Cope, Amer. Nat., XXIII, Feb., 1889, 132. Chapada specimens. (Separates dated May 25, 1889.)

Myrmecophaga ?sellata Cope, *ibid.*, p. 133 (the Chapada specimen only).

Tamandua tetradactyla Thomas, Proc. Zoöl. Soc. London, 1903, II, 242 (April 1, 1904).

Type, No. 369, ♀ ad., skull, Chapada, Matto Grosso, Brazil, July, 1885; coll. Herbert H. Smith. Cotype, No. 1417, skin, same locality and collector.

Size medium; nasals short; frontals prolonged anteriorly; occipital condyles extending considerably beyond the occipital plane. Occipito-nasal length, 125; basal length (without premaxillaries), 127; greatest breadth at front edge of orbits, 37; width of braincase, 42; length of nasals, 42.5 (equal to width of braincase). (For further skull measurements see table, p. 398; for comparison with allied forms see p. 396.)

Light areas ochraceous buff; shoulder bands as usual in the group; dark area of body reaching to base of tail; light dorsal stripe extending to posterior third of dark area; hairs of dark area very long, light buffy ash for basal half and tipped (many of them) with the same color, mixed with many wholly black, giving a grizzled grayish black general effect.

The pelage is much longer, coarser, and heavier, and the light band at the base of the hairs several times broader than in any of the Santa Marta specimens. Unfortunately external measurements are lacking,[1] but apparently it is a short-tailed form, like the Santa Marta animal, in comparison with the Mexican and Panama forms.

Cope distinguished his *M. bivittata straminea* as being straw-color, with two black bands on the shoulders and a black patch on the abdomen. As the locality is in doubt, and no cranial characters were given, it must remain at present indeterminable. The common form, here named *chapadensis*, of which he had several specimens (part of the series here under consideration), he distinguished as *M. bivittata* Desm. (= *tetradactyla* Linn.).

Tamandua tetradactyla instabilis, subsp. nov.

Fig. 1, p. 390.

Tamandua tetradactyla Sclater, Proc. Zoöl. Soc. London, 1871, 546, pl., xliii (colored figure of a Santa Marta specimen).

[1] It is to be regretted that Mr. Thomas failed to publish the flesh measurements of the large series of Chapada specimens collected for the British Museum by Mr. A. Robert (*Cf.* Proc. Zoöl. Soc., 1903, II, p. 242). Such measurements are always of the greatest value to subsequent investigators.

Type, No. 23420, ♀ ad., Bonda, April 7, 1899; coll. Herbert H. Smith.

Size small; tail short, about .80 of length of head and body. Coloration and pattern of markings variable. Type, a medium example: Dark area blackish brown with a tinge of reddish, extending, below, from the chest to the tail, including proximal portion of the hind limbs, and above from the shoulders to the hips, with a median extension to the base of the tail, with two bands, averaging about 15 mm. wide, extending obliquely forward and downward to the front edge of axillæ; light area straw-yellow, brightening to pale ochraceous on the posterior part of head, sides of neck and nuchal region, from which a median dorsal stripe, about 10 mm. wide at its inception, runs backward to a point opposite the hips; an indistinct dusky band on the side of the face extending back only to the posterior canthus of the eye.

About half the specimens in a series of 40 now available for inspection, conform in pattern, in a general way, to this type, but the color of the dark area varies from pale reddish brown to black, and the light areas from nearly clear white to deep ochraceous, generally most intense on the nuchal region, with the light median dorsal stripe varying in extent, sometimes terminating about the middle or anterior third of the dark area or extending entirely through it, dividing it into right and left halves. In four specimens the light median line is cut off anteriorly at the hair-whorl on the withers by the interscapular and nuchal regions being dark rusty brown, scarcely different in color from the adjoining dark areas. In another specimen, in which the nuchal-interscapular space is quite as dark as the body, there is nowhere any trace of a light median stripe. In specimens in which the dark areas are nearly black, the white areas may be either nearly pure white or strongly ochraceous, darkening on the nuchal region to ochraceous brown.

Measurements.—Type: Total length, 979; head and body, 546; tail, 433. Fourteen specimens give the following: Total length, 957 (865-1056); head and body, 542 (513-607); tail, 414 (347–465). Skull, type, occipito-nasal length, 115; width of braincase, 39; length of nasals, 39. (For additional measurements of the skull see table, p. 397; for further comparison with other forms see p. 396.)

This is another Santa Marta form which differs from its nearest allies in markedly smaller size, paler tints, and excessive color variability. The other especially notable cases are the Raccoon (*Procyon cancrivorus proteus*) and the Tayra (*Tayra barbara irara*); the Kinkajou (*Potos flavus megalotus*) and the Peccary (*Tagassu torvum*) are also small forms.

Other cases of small size and instability in color occur among the Rodents and Marsupials.

As Gray cites under his var. *opistholeuca* (Hand-List Edentates, etc., p. 27) Sclater's figure of a Santa Marta specimen, it may be claimed that Gray's name should be adopted for the Santa Marta form. He indicated no type and gave no description beyond the phrase "Rump to the middle of the back white," which is wholly meaningless in view of the variability of Anteaters in general in respect to this feature of the coloration. He enumerates under the name *opistholeuca* 10 specimens, 2 of which are from New Grenada, 3 from Guatemala, 1 from Costa Rica, 1 from Brazil, and 2 from "tropical America." It is safe to say that none of these specimens are likely to prove closely related to the Santa Marta form. The chance citation, therefore, of Sclater's then recently published colored plate seems insufficient to fix Gray's name *opistholeuca* on the Santa Marta animal.

It is of interest to note that Sclater on receiving, later, other living specimens of the Tamandua, "probably from Brazil" (*l. c.*, p. 624, 625), noted "well-marked points of difference" between them and the Santa Marta specimen.

Tamandua tetradactyla tenuirostris, subsp. nov.

Fig. 3, p. 390.

Type, No. 17272, ♀ ad., Passa Nueva, State of Vera Cruz, Mexico, April 11, 1901; coll. A. E. Colburn.

Size large; tail long, equalling the length of head and body. Coloration and pattern of markings apparently showing little variation. Type: Light areas white faintly tinged with yellowish, the yellow tint a little stronger on the nuchal-interscapular space than elsewhere; median light dorsal line extending to hips; dark area purplish black, sharply defined against the white, and reaching the base of the tail, both above and below.

Four other adults and one young specimen agree almost exactly with the type in coloration and pattern of the markings, except in the posterior extension of the black on the dorsal surface, which in some extends on to the base of the tail and in others terminates on the rump. In a fifth specimen the black extends only to the hips, and is divided the whole length by the light median line; the shoulder bands are greatly narrowed posteriorly and become obsolete at their junction with the black area behind the shoulders. The black area in two specimens is purplish black and in the others clear black.

Measurements.—Total length, 1185; head and body, 585; tail, 600; hind foot, 95. Three adults, all females, measure, total length, 1178 (1155–1195); head and body, 598 (583–627); tail, 580 (568–600); hind foot, 94 (93–95). Skull, occipito-nasal length, 133; width of braincase, 42; length of nasals, 55 (much longer than width of braincase). Four skulls measure, total length, 127.5 (122–133); width of brain case, 41 (40–42); length of nasals, 47.2 (43–51).

The present form is especially characterized by the narrow and tapering form of the skull anterior to the braincase. In size it agrees well with the Chiriqui form, described below, but in coloration the light area is clearer white, and the form of the skull is strikingly different.

The relation of Cope's *Myrmecophaga sellata* (Amer. Nat., XXIII, 1889, p. 133), founded on a somewhat imperfect skin, without skull, from "Honduras," to the present form cannot now be determined. His description of the color and markings of this specimen does not, however, agree well with the present series from Vera Cruz.

Tamandua tetradactyla chiriquensis, subsp. nov.

Fig. 4, p. 390.

Type, No. 18883, ♀ ad.; Boqueron, Chiriqui, Panama, Oct. 16, 1901; coll. J. H. Batty.

Size large; length of tail about equal to length of head and body. Dark areas deep brownish black; light areas dull brownish buffy white, instead of nearly clear white as in *T. t. tenuirostris*, more deeply colored on the nuchal-interscapular region. The black extends for nearly four inches on the basal portion of the tail, but mixed more or less with light hairs. The light median dorsal stripe terminates considerably in front of the hips. Two other specimens are similar, with the black on the base of the tail equally extensive but clearer black.

Measurements (type).—Total length, 1180; head and body, 610; tail, 555; hind foot, 100; ear, 50. Two other females, not fully adult (as shown by the skulls), measure, respectively: Total length, 1120, 1165; head and body, 540, 580; tail 580, 600; hind foot, 90, 90; ear, 40, 45. Skull (type), occipito-nasal length, 132.5; width of braincase, 42; length of nasals, 55. Another younger skull (female) measures a little less, as follows: Occipito-nasal length, 129; width of braincase, 41; length of nasals, 51.

An adult female from the Rio Cauquita, southwestern Colombia, is exactly like the Boqueron specimens in size,

coloration, and cranial details. A skull, without skin, from near San José, Costa Rica, is also indistinguishable from the adult Boqueron skulls. Apparently *T. t. chiriquensis* will be found to range from Costa Rica to the Cauca region of western Colombia. A young specimen, from Boquete (alt. 5500 feet), Chiriqui, has the light area clear white, but in cranial characters agrees with the Boqueron specimens.

The relation of Cope's *Myrmecophaga sellata*, already referred to, to *T. t. chiriquensis* and *T. t. tenuirostris* can only be determined by an examination of a series of specimens from the type locality.

The four subspecies of *Tamandua tetradactyla* above described fall into two groups characterized by the character of the rostral portion of the skull, as follows:

A. Rostral portion of the skull short and broad, with the ratio of nasals to occipito-nasal length as 35 to 100, and the ratio of the greatest breadth of the skull at the anterior edge of orbits to the occipito-nasal length as 28.5 to 100; length of nasals about equal to width of braincase.

a. Size small (occipito-nasal length, 118) ..... *instabilis.*

b. Size medium (occipito-nasal length, 124.5) ..... *chapadensis*

B. Rostral portion of the skull long, with the ratio of nasals to occipito-nasal length as 39 to 100; nasals much longer than the width of the braincase.

a. Rostral portion of the skull narrow; ratio of greatest breadth of skull at anterior edge of orbits to occipito-nasal length as 24.4 to 100 ..... *tenuirostris.*

b. Rostral portion of skull broad; ratio of greatest breadth of skull at anterior edge of orbits to occipito-nasal length as 27.5 to 100 ..... *chiriquensis.*

External Measurements of 19 Specimens of *Tamandua tetradactyla instabilis.*

[The determination of the sex of the Santa Marta series has been made from an examination of the skins, adults being readily distinguishable by the presence of a pectoral pair of well-developed nipples in the females. The absence of nipples has been taken to indicate males. Where no sex is indicated the specimen is a skull or skeleton, and hence the sex indeterminable. The external measurements, "total length" and "tail," are from the collector's labels. All the specimens are from Bonda, near Santa Marta, Colombia.]

14666	♂	Total length,	945;	head and body,	518;	tail vertebræ,	427.				
14672	♂	"	"	941;	"	"	"	533;	"	"	408.
23563		"	"	1018;	"	"	"	607;	"	"	408.
23440		"	"	939;	"	"	"	543;	"	"	396.
23405	♀	"	"	865;	"	"	"	513;	"	"	347.
23416	♂	"	"	978;	"	"	"	570;	"	"	408.
23417	♀	"	"	992;	"	"	"	559;	"	"	433.
23419	♀	"	"	981;	"	"	"	579;	"	"	402.
23420	♀	"	"	979;	"	"	"	546;	"	"	433.
23422	♀	"	"	929;	"	"	"	559;	"	"	370.
23423	♀	"	"	941;	"	"	"	533;	"	"	408.
23424	♂	"	"	992;	"	"	"	584;	"	"	408.
23426	♀	"	"	967;	"	"	"	534;	"	"	433.
23427	♀	"	"	992;	"	"	"	533;	"	"	459.
23430		"	"	967;	"	"	"	521;	"	"	446.
23432	♂	"	"	891;	"	"	"	483;	"	"	408.
23434		"	"	1056;	"	"	"	591;	"	"	465.
23436		"	"	1018;	"	"	"	559;	"	"	459.
23440		"	"	929;	"	"	"	534;	"	"	395.
Average		Total length,	964;	head and body,	547;	tail vertebræ,	427.				

MEASUREMENTS[1] OF 20 SKULLS OF *Tamandua tetradactyla instabilis.*

Mus. No.	Sex.	Occip.-nasal length.	Basal length.	Antorb. breadth.	Interorb. breadth.	Width of brain-case.	Width across bullæ.	Nasals. Length.	Nasals. Width at front border.	Nasals. Least width.	Nasals. Width at post. border.
14667	y. ♀	118.5	116	30	23	41	36	42	7	6	10
14673	m. ♀	119	115	33	23.5	40	33.5	43	8	8	10.5
14675	o. ?	116	113	32	23	39	34.5	42	8	7	11
14666	y. ♂	110	108	—	22	38	33.5	37.5	7	7	12
14866	o. ♂	119	119	34	25	41	33	43.5	8	6.5	11
14664	y. ?	113	109	32.5	22.5	39	36	41	8	8	13
14668	o. ♂	118	115	33	24	40	34.5	44.5	9	5.5	13
14669	o. ♀	110	106	30.5	22.5	39	33.5	37	8	7	12
23410	o. ♂	119.5	115.5	32	24	40.5	34	43	10	8	14
23417	o. ♀	120	117	34	24.6	40	34	45	10	8	12
23408	o. ♀	119	115	34	24.3	41.5	36	41.5	9	8	13
23409	o. ♂	115	112	31	23.4	40	33	42	8	8	14
23422	o. ♀	121	119	34	25.6	40	33.5	46	9	8	13.5
23420	m. ♀	115	112	33	22.5	39	34.5	39	9.3	8	12
23426	o. ♀	118	114	32	24	39.3	33	41.5	8	7.5	12
23425	o. ♂	116	112	32.5	23	40	33.5	41	10	9	14
23427	o. ♀	112	110	33	23	—	—	39	8	8.5	12
23423	o. ♀	110	108	34.7	25	41	34	38.5	9	8	11
23424	o. ♂	119.5	115.5	33	24	39	35.3	48	9	7	12
23428	o. ♀	121	118	34	25	41.5	37.5	41	10	10	14
Average..		118	113.5	32.8	23.7	39.4	34.2	41.8	8.7	7.7	12.3

[1] *Explanation of Measurements.*

Occipito-nasal length = front edge of nasals to most projecting part of occipital plane.

Basal length = front edge of maxillaries to posterior border of occipital condyles, the premaxillaries being usually detached or wholly lacking in museum specimens.

Antorbital breadth = greatest breadth at front edge of orbits.

Width across bullæ = distance between outer edges of bullæ.

The letters y., m., and o., placed before the sign for sex, refer to age, and mean, respectively, young, middle-aged, and old.

Sex determined as explained in the preceding table of external measurements.

MEASUREMENTS OF TAMANDUA SKULLS.[1]

	Mus. No.	Sex.	Occip.-nasal length.	Basal length.	Antorb. length.	Interorb. breadth.	Width of brain-case.	Width across bullæ.	Nasals. Length.	Nasals. Width at front border.	Nasals. Least width.	Nasals. Width at post border.
T. chapadensis.[2]	370	m. ?	121	121	33.5	25.5	41	36	41	7	6	11
	371	y. ?	114.5	——	33.5	24	40	36	42.5	8	7	11
	372	o. ?	133	132.5	37	28	43	39	41.5	7.5	7.5	11.5
	373	o. ?	125.5	123	35	27	43	38	43.5	8	7.3	12.5
	368	o. ?	127	124.5	37	26	42	37.5	45	9	7.3	15.5
	369	o. ♀	125	127	37	25.5	42	36	42.5	7	5.5	10
	Average..		124.3	125.6	35.5	26	42	37	42.7	7.8	6.8	11.9
T. chiriquensis.[3]	18883	o. ♀	132.5	124	38.5	27	42	36.5	55	10	7	14
	18884	m. ♀	129	126	33.5	24.3	41	37	51	8	6	12.5
	14222	y. ♀	129.5	125	34.8	24	40	37	49	8	7	12
	10087	o. ?	124.5	120	35.3	25.3	39.3	35.5	47	8	6.5	10.5
	Average..		129	124	35.5	25	41.8	36.5	50.5	8.5	6.6	12.2
T. tenuirostris.[4]	17270	o. ♀	130	126	32	24	41	35	51	8.5	7.5	10
	17271	m. ♀	124	123	32	24	40.5	34	43	7	8	9.3
	17273	m. ♀	122	119	31	24	40	34	44	7.5	7.3	10
	17272	o. ♀	133	132.5	32.3	24	42	37	51	8	8	11
	Average..		127	125	32	24	40.9	35	47.2	7.8	7.7	10.1
T. longicaudata.[5]	16935	o. ♀	131.5	128	35	26	42.5	35	48	9	8	12
	16936	m. ?	124	121	35	26.5	40	36	41	8	7	11.5
	17561	y. ♀	125	121	34.8	24.5	40.5	35	48.5	9	8.5	13
	21303	m. ♂	125	121.5	33	23	39	35	45.3	9	7	10.5
	Average..		126.4	123	34.5	25	40.5	35.2	45.7	8.8	7.6	11.8

[1] For explanation of measurements see preceding table.
[2] All from Chapada, Matto Grosso, Brazil.
[3] Nos. 18883 and 18884, Boqueron, Chiriqui, Panama; No. 14222, Rio Cauquita, Colombia; No. 10087, near San José, Costa Rica.
[4] All from Passa Nueva, Vera Cruz, Mexico.
[5] All from Caura district, Venezuela.

(*Continued from 4th page of cover.*)

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. Pp. 77–132. January, 1902. Price, $1.00.

PART IV.—Shell Heaps of the Lower Frazer River. By Harlan I. Smith. Pp. 133–190, pll. vi, vii, and 59 text figures. December, 1902. Price, $1.00.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 1–270. January, 1902. Price, $3.00.

PART II.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 271–402. December, 1902. Price, $1.50.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. Pp. i–xvi, 1–332, pll. i–viii (5 colored), and 19 text figures. May, 1902. Price, $5.00.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. January, 1902. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. i–xxviii. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.

Volume I, 1881–86	Price, $5.00	Volume XI, Part III, 1900,	Price, $2.00
" II, 1887–90	" 4.75	" " IV, 1901	" 1.75
" III, 1890–91	" 4.00	" " (Complete)	" 5.00
" IV, 1892	" 4.00	" XII, 1899	" 4.00
" V, 1893	" 4.00	" XIII, 1900	" 4.00
" VI, 1894	" 4.00	" XIV, 1900	" 4.00
" VII, 1895	" 4.00	" XV, Part I, 1901	" 3.00
" VIII, 1896	" 4.00	" XVI, 1902	" 5.00
" IX, 1897	" 4.75	" XVII, Part I, 1902	" 1.50
" X, 1898	" 4.75	" " " II, "	" .75
" XI, Part I, 1898	" 1.25	" XVIII, " I, "	" 2.00
" " " II, 1899	" 2.00	" XIX, 1903	" 6.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued quarterly. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of from about 400 to 700 pages, and from about 25 to 60 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I.

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the Report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4.20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

PART VIII.—The Reptilian Subclasses Diapsida and Synapsida and the Early History of the Diaptosauria. By Henry Fairfield Osborn. Pp. 449–507, pl. xl, and 28 text figures. (With Contents and Index to Volume I.) November, 1903. Price, 2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price. $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

PART II.—The Basketry of the Tlingit. Pp. 229-277, pll. v–xviii, and 73 text figures. July, 1903. Price, $2.00.

(*Continued on 3d page of cover.*)

19

Mammals from the District of Santa Marta, Colombia, Collected by Mr. Herbert H. Smith, with Field Notes by Mr. Smith.

By J. A. Allen.

AUTHOR'S EDITION, extracted from BULLETIN

OF THE

American Museum of Natural History,

Vol. XX, Article XXXV, pp. 407–468.

New York, November 28, 1904.

The Knickerbocker Press, New York

Article XXXV. — REPORT ON MAMMALS FROM THE DISTRICT OF SANTA MARTA, COLOMBIA, COLLECTED BY MR. HERBERT H. SMITH, WITH FIELD NOTES BY MR. SMITH.

By J. A. Allen.

Mainly through the personal gift of President Morris K. Jesup of the American Museum of Natural History, the Museum has acquired the large collection of mammals and birds[1] made chiefly near the coast in the vicinity of Santa Marta, Colombia, under the direction of Mr. and Mrs. Herbert H. Smith, who, through previous explorations in southern Brazil, the West Indies, and Mexico, had acquired an almost world-wide reputation as expert collectors, particularly in entomology, botany, and ornithology. They took with them several assistants, and also made extensive use of the native hunters in securing the larger mammals. The first shipments reached the Museum towards the end of 1898 and during 1899; a certain number of specimens were selected, according to previous agreement, for the Museum and the others were held in storage. The final shipment reached the Museum late in 1901, and remained in the original packages till the early part of the present year when, together with the duplicates from previous shipments, they were purchased by the Museum, and the whole collection of mammals became for the first time available for examination. Much use, however, had previously been made of the available portions, as shown by the list of publications based thereon given below.

The collecting of mammals and birds formed only a part of the grand scheme of a general natural history survey of the whole Department of Magdalena, planned by Mr. Smith, but which circumstances quite unlooked for rendered impossible to carry out, his long and serious illness in the field being soon followed by a political revolution which rendered work impracticable, the immediate scene of Mr. Smith's labors being

[1] A set of duplicates was sent, by special arrangement, direct to the Carnegie Museum at Pittsburg, but subsequently most of these came under my observation.

alternately overrun by insurgent and government forces. I am greatly indebted to Mr. Smith for the following account of the physical features of the region, a detailed list of the localities at which collections were made, and for field notes on many of the species. The field notes are distinguished by marks of quotation and the initials H. H. S.

Description of the Region.

By Herbert H. Smith.

The collection of mammals and birds for the American Museum of Natural History was made during three years and a half, March, 1898, to September, 1901. My original intention had been to explore the whole Department of Magdalena; that is, northern Colombia from the Magdalena River to Venezuela, and extending from the coast over 200 miles inland. Almost in the outset, I was laid up for six months by a severe illness; subsequently my plans were frustrated by a civil war, which made travelling practically impossible. Our work was thus restricted to a comparatively small area in the northwestern corner of the Department. A brief description of this region may be useful and I shall preface it with some general remarks on the mountain region to which it belongs.

The Sierra Nevada de Santa Marta is an isolated mass about midway between Magdalena and the Venezuelan frontier, and within sight of the northern coast. It is nearly 18,000 feet high, and has a very extensive snowfield, stretching probably thirty miles from southwest to northeast. The Sierra Nevada does not belong to the Andean system; westward it is separated from one branch by the broad plains of the Magdalena, and to the east and southeast a long valley divides it from the Black Andes. This valley is drained by the river Cesar, flowing south-southwest to the Magdalena, and the river Rancheria, passing northward to the coast; the sources of these streams are close together, and the pass between them is said to be less than 1000 feet above sea-level. A depression of 1000 feet, therefore, would reduce the Sierra Nevada region to an island, separated from the continent by

a narrow channel on the east and south and a broader one on the west. This almost insular character of the region is important and should be borne in mind. It may be noted that the geological formations of the Sierra, as far as we have any knowledge of them, show no direct relations with those of the Andes. There are no active volcanoes, and no extinct ones are certainly known. Earthquakes are common in the Andean chain and their vibrations are sometimes felt simultaneously from Peru to the Caribbean Islands; but they do not affect the Sierra Nevada. The occasional slight tremors recorded are purely local.

North of the Sierra the Caribbean coast extends nearly east and west; but at Cabo de Aguja, near Santa Marta, it turns southward at a right angle; twenty miles from the point the high coast touches the plain about the great lagoon called La Cienega; beyond this the mountainous lands adjoin the plain along the north and south line. The plain and lagoon are part of the estuary system of the Magdalena.

Our explorations were made mainly within a triangle formed by the coast and the San Lorenzo Mountains. These mountains form a lower chain, trending from west-southwest to east-northeast, and are separated from the Sierra Nevada by a narrow and deep valley; the Horqueta, one of their peaks, is 8400 feet high as measured by my aneroid, and I judge that the San Lorenzo Mountains, which I did not reach, are at least 500 feet higher. To the northwest of the principal range are several lower ridges, roughly parallel to it and abutting diagonally on the northern coast. This portion of the coast is remarkably picturesque, a succession of rocky headlands with deep bays between the ridges; the bays are often backed by sand beaches and mangrove swamps of no great extent. Further east the headlands are no longer seen, and low, rolling lands extend back to the base of the Sierra Nevada.

Numerous streams rise in the San Lorenzo Mountains, flowing down through deep ravines in long series of cascades; as they approach the coast they have wide valleys with more or less alluvial land. The most important of these streams

are the rivers Cordova, Frio, Gaira, Manzanares, Piedras, Buritaca, and Don Diego. The only swamps are those of the Magdalena estuary, some small patches along the lower courses of the rivers, and the mangrove thickets.

With the exceptions noted below the whole region is covered with forest; but there are two strongly contrasted growths, which I distinguish as mountain forest and dry forest. Locally these are called mata and pampa, the latter term, in this region, including dry forest as well as grass lands.

The true mountain forest is a matted growth of trees and vines with numerous epiphytes and ferns; very few trees shed their leaves at stated seasons, and the forest is damp and verdant throughout the year. In the dry forests, on the contrary, nearly all the trees and vines are leafless during the latter part of the dry season, February to May; the few peculiar ferns die down to the roots. Grasses and herbs are abundant wherever the ground is not too shady, but they wither during the dry months. The distinction of plant species is almost complete, and is all the more remarkable because the two kinds of forest exist side by side; during the rainy months an unpractised traveller will hardly note that he is passing from one flora to another; but in March the dry forest is almost leafless, while the other is green and luxuriant.

The extreme summits of the San Lorenzo Mountains are generally without large trees, the low growth consisting of bromelias, ferns, bushes, etc. But with these exceptions the mountain forest covers everything down to a level of about 2000 feet above the sea; below that it extends in narrow lines along the river shores, sometimes to the coast. Further east, near Don Diego, the mountain forest comes down bodily to the seashore or near it.

The dry forest covers most of the remaining country, sometimes with a heavy growth of high trees, sometimes lower and more open; on dry hills near the coast it becomes 'scrub,' seldom over twenty-five feet high, but with little change of plant species. In the river valleys it is generally separated from the water by a thin line of trees like those of

the mountain forest. On ridges and hills, especially in Manzanares valley, the trees often disappear altogether or grow scattered over the open grass lands.

I have been thus explicit in describing the two kinds of forest because they exist in all parts of tropical America, and, in my opinion, the distinction is interesting and significant. The 'pampa' of the Santa Marta district is the 'campo' and 'coatinga' of Brazil, and the scrubby growth of lower hills in the West Indies; a modified form is the 'chapparal' of Mexico. Everywhere the plants are different from those of the swamp forest; generally the trees are lower, often small and gnarled and sometimes scattered; and everywhere they shed their leaves during the dry season. The difference does not always correspond to a difference of soil or situation; the two kinds of forest may adjoin each other on level ground or on a mountain side, on land equally dry or humid.

It is impossible to avoid the impression that the dry forest is an old, stunted, and worn out vegetation, tending to extinction, while the swamp forest, with its exuberant growth, is plant life in the vigor of youth. Such impressions cannot be accepted as scientific truths, yet they may point in the right direction. It appears certain that the swamp forest is gradually encroaching on the other; this can be observed nearly everywhere. It is possible that the dry forest, with its open lands or 'campos,' represents an older flora.

As yet we have no comparative lists of the plants; and until these are drawn up and we know more about the tertiary and quaternary floras of South America we can reach no definite conclusions on the question. As animals pass readily from one kind of forest to the other, it may be impossible to determine their original habitats; yet certain species and groups can be assigned with some confidence. To the dry forest region, for example, belong the deer with branched horns (except *C. palustris* [= *Odocoileus palustris*], which is an inhabitant of the river plains), all the tropical American Canidæ, hare, and all, or nearly all, the armadilloes. The puma and one or two unicolored cats affect the dry forest. The ostrich, common in the interior of Brazil, lives exclusively

on the open lands and can hardly be driven into the forest. It is much more difficult to designate the mammalia of the damp forest, because all of them wander into the dry forest where the trees are high and thick enough; such as the monkeys, the spotted Felidæ, various tree-loving carnivora, such as the kinkajou, sloths, opossums, all the deer with unbranched horns, wild hogs, and tapirs; the herbivorous species sometimes enter the open lands, but generally at night. The great anteater and tamandua seem to wander indifferently in both kinds of forest, but the little tamandua belongs in the damp forest, as does the sloth. Among rodents, pacas and squirrels may be assigned to the damp forest, as may many rats; agoutis seem to live indifferently wherever they have shade and food; capivaras belong to the river-plains. The land-shells and insects of the two kinds of forest are strongly contrasted. Among the latter, for example, *Hypocephalus* inhabits the dry-forest region of Bahia; it is a remarkable beetle combining the characters of many families; Leconte and Horn regard it as an archaic type.

I have already called attention to the semi-insular character of the Sierra Nevada, and this region also includes the San Lorenzo Mountains; with such conditions we may naturally look for some peculiar species. To some extent the collections already made bear out this supposition; certain mammalia, birds, insects, and land-shells are known only from this region. But we cannot speak confidently about them until we have larger collections from adjoining districts, and especially from the Black Andes. It is even possible that some plants may be peculiar to the Santa Marta region. My own large collection of phanerogams and ferns includes several hundred species not previously known. But plants are readily distributed by their seeds, and they are not likely to be limited by narrow valleys; probably most or all of these species will eventually be found in the Black Andes.

Following is a list of the principal localities marked on my labels. Our hunters often made long excursions and we could not tell accurately the altitudes from which specimens were brought; the figures given are approximate only.

1. *Santa Marta:* City in a bay of the same name, north of the Manzanares River; the bay is backed by salt plains and surrounded by dry hills covered with a scrubby growth (dry-forest species). Considerable tracts of the lower lands are irrigated.

2. *Bonda:* Village on the river Manzanares, 7 miles east of Santa Marta. This was our head quarters during the greater part of our stay in Colombia. The village itself is only 150 feet above sea-level, but most collections were made in somewhat higher land. The country is hilly, covered in great part with dry forest with intervals of open grass land in the ridges. A thin line of mountain forest adjoins the river.

3. *Mamatoco:* Village on the Manzanares, 2 miles below Bonda; elevation 100 feet; vegetation as at Bonda, but with more scrubby growth on the hills and some small tracts of swamp. Cantilito is a small plantation between the two villages, adjoining Quebra Mojada, a stream and ravine.

4. *El Libano:* Plantation 1 mile south of Mamatoco; elevation 150 feet. This must not be confounded with the locality of the same name among the mountains.

5. *Masinga:* Valley on the Manzanares, 1 mile above Bonda. Elevation 250 feet; vegetation as at Bonda.

6. *Masinga Vieja:* On the Manzanares, about 4 miles above Bonda, at 600 feet; it is the site of an Indian village, now abandoned. The line of mountain forest along the river has here become broader; the neighboring ridges rise to 1000 feet and are generally open and grassy.

7. *Onaca:* Plantation, 18 miles E. S. E. of Santa Marta, at the lower border of the main mountain forest, which here adjoins the open lands. Elevation 2000 feet.

8. *Jiracasaca:* Plantation near Onaca, and at about the same level.

9. *Las Nubes:* Plantation 3 miles south of Onaca, at 4500 feet; large clearings in the mountain forest. Alto de Cielo is a locality and clearing near it, at 5000 feet.

10. *Don Amo:* Plantation 18 miles east of Santa Marta, in a mountain valley, at 1500 feet; large clearings in mountain forest, with adjoining dry forest and open lands. Don Amo Viejo is a locality near it.

11. *Cacagualito:* Plantation 20 miles east of Santa Marta, 1500 feet; vegetation principally mountain forest, which here extends to a lower level. Jordan is a plantation 2 miles further east, in a valley, at 1000 feet.

12. *Taganga:* Fishing village on a bay of the same name, 2 miles northeast of Santa Marta, surrounded by low mountain ridges; the country is very dry, with a scrubby growth (dry-forest species) and

numerous cacti. The coast is rocky and high, sometimes with surf-washed caves in which bats are abundant. Guairaca, Clinto, and Neguanje are uninhabited localities on the coast further east.

13. *Buritaca:* A river entering the sea about 40 miles east of Santa Marta. The mountain forest here comes down bodily to the coast, where there are sand-beaches and mangrove-swamps; the country is low and damp. There are small tracts of open grass land near the river mouth.

14. *Don Diego:* Plantation on the coast at the mouth of the river Don Diego, five miles east of the Buritaca and with similar surface and vegetation.

15. *Minca:* Plantation on the river Gaira, 12 miles southeast of Santa Marta, at the lower border of the main mountain forest, which here adjoins dry forest and open grass lands. Elevation 2000 feet.

16. *Agua Dulce:* Plantation 2 miles southeast of Minca, at 2400 feet; large clearings in mountain forest.

17. *Valparaiso:* Plantation near the head of the river Gaira, 20 miles southeast of Santa Marta, 4500 feet. Extensive clearings in the mountain forest. Las Purtidas is a locality near it at 3500 feet.

18. *El Libano*, Cerro del Libano, or Sierra del Libano (names used by American planters): This is a locality rather than a mountain, and we camped there for several weeks. The camp was in a valley of the San Lorenzo mountain range, 5 miles southeast of Valparaiso and about 25 miles from Santa Marta; elevation about 5500 feet. The forest here is very dense and luxuriant, only broken by two small clearings; collections were mainly from rocky mountain sides, 5000 to 6500 feet

19. *Cienega, or La Cienega:* Town on the coast adjoining the great lagoon of the same name; the lagoon belongs to the estuary system of the Magdalena. The country around is flat, swampy in places, and with salt plains; two or three miles back are dry hills with a scrubby growth (dry-forest vegetation). Rio Frio is a town a few miles south of Cienega, on a river of the same name; Gaira, on the Gaira River, is between Cienega and Santa Marta, on low land. These towns are connected by a railroad.

The mammals forming the basis of the present paper number about 1250 specimens and represent 73 species, of which about 30 appear to be forms peculiar to this region, termed 'semi-insular' by Mr. Smith (*cf. antea*, p. 412). The birds also have yielded a high percentage of peculiar forms, as determined by Mr. Outram Bangs and myself.[1]

[1] A report on the birds of this collection was published in Vol. XIII of this Bulletin (August, 1900, pp. 117–183).

As shown by Mr. Smith's list of localities (*antea*, p. 413) the greater part are near the coast at altitudes ranging from sea-level to about 600 feet; a few are between 1000 and 1500 feet, one at 2000, and three at 4500 to 6000 feet; but probably fully two thirds of the specimens were collected below 1000 feet, only a few weeks out of the three years and a half having been spent by Mr. Smith's collectors at altitudes as high as 4500 feet. These were all in the San Lorenzo Mountains, the Sierra Nevada de Santa Marta not being visited. The area, as indicated for me by Mr. Smith on a map of Colombia, is a triangle of which the west side (length about 25 miles) is formed by Magdalena Bay, the north side (length about 30 miles) by the coast of the Caribbean Sea, the other or inland side (length about 40 miles) forming the hypothenuse of the triangle, the whole district probably not exceeding 600 square miles.

While Mr. Smith was preparing for his exploration of the Santa Marta region of Colombia, it happened that the Messrs. A. E. and O. Bangs of Boston had also been attracted to the same region as one of special interest, and, to the surprise of all the parties interested (*cf.* this Bulletin, XIII, p. 118), when Mr. Smith reached Santa Marta, after preparations for financing the trip and gathering the necessary equipment, he found Mr. W. W. Brown already in the field in the interest of the Messrs. Bangs Brothers. As, however, Mr. Brown proceeded soon to the Sierra Nevada de Santa Marta, working at altitudes and in a region for the most part above the district reached by Mr. Smith, there was little duplication of work. Mr. Brown naturally thus obtained a number of species not represented in the Smith material, which, with some others from the coast region, were very promptly made known by Mr. Bangs. In his final paper on the Santa Marta collection of mammals (Proc. New Engl. Zoöl. Club, I, 1900, pp. 87–102) he records 7 species not contained in the Smith collection, while the latter includes 26 species not in the Brown collection. Some of the larger species obtained by Mr. Brown, as *Felis concolor*, *Felis onca*, *Myrmecophaga tridactyla*, etc., are, however, mentioned in Mr. Smith's field notes, and for this reason are included in the present paper.

As already intimated, the material in the present collection has already served, in part or exclusively, as a basis of a number of previously published papers, and in the present connection it has been deemed sufficient merely to cite these earlier papers instead of repeating their substance. I append here an annotated list of these earlier papers, all of which appeared in this 'Bulletin.'

1899. New Rodents from Colombia and Venezuela. *Bull. Am. Mus. Nat. Hist.*, XII, 1899, pp. 195–218. Dec. 20, 1899.

The new species from Santa Marta are: (1) *Lepus* (*Sylvilagus*) *superciliaris* (p. 196); (2) *Isothrix rufodorsalis* (p. 197); (3) *Echimys* (= *Proechimys*) *mincæ* (p. 198); (4) *Echimys* (= *Proechimys*) *canicollis* (p. 200); (5) *Heteromys jesupi* (p. 201); (6) *Akodon columbianus* (p. 203); (7) *Oryzomys maculiventer* (p. 204); (8) *Oryzomys trichurus* (p. 206); (9) *Oryzomys sanctæmartæ* (p. 207); (10) *Oryzomys mollipilosus* (p. 208); (11) *Oryzomys magdalenæ* (p. 209); (12) *Oryzomys villosus* (p. 210); (13) *Sciurus saltuensis bondæ* (p. 213).

1900. List of Bats Collected by Mr. H. H. Smith, in the Santa Marta Region of Colombia, with Descriptions of New Species. *Ibid.*, XIII, pp. 87–94. May 12, 1900.

Twenty-two species. The new species are (1) *Chiroderma jesupi* (p. 88); (2) *Micronycteris hypoleuca* (p. 90); (3) *Promops affinis* (p. 91).

1900. Descriptions of New American Marsupials. *Ibid.*, XIII., pp. 191–199. Oct. 23, 1900.

The new Santa Marta forms are (1) *Didelphis karkinophaga* (= *marsupialis*) *colombica* (p. 193); (2) *Metachirus nudicaudatus colombianus* (p. 196).

1904. Mammals from Southern Mexico and Central and South America. *Ibid.*, XX, pp. 29–80. February 29, 1904.

One new Santa Marta form, *Tayra barbara irara* (p. 36).

1904. New Bats from Tropical America, with note on species of *Otopterus*. *Ibid.*, XX, pp. 227–237. June 29, 1904.

A new Santa Marta species is *Molossus bondæ* (p. 228).

1904. New Mammals from Venezuela and Colombia. *Ibid.*, XX, pp. 327–335. Oct. 8, 1904.

The new Santa Marta forms are: (1) *Felis sanctæmartæ* (p. 332); (2) *Procyon proteus* (p. 333).

1904. The Tamandua Anteaters. *Ibid.*, XX, pp. 385–398. Oct. 29, 1904.

A new form from Santa Marta is *Tamandua tetradactyla instabilis* (p. 392).

In addition to the 23 new forms enumerated above, three others will be found described in the present paper, while 10 have been described by Mr. Bangs and 1 by Mr. G. H. Miller, Jr., or 37 in all, out of a total of 86 species recorded from the Santa Marta region. It is probable that still others will require new names, since several of the species of *Oryzomys* recorded by Mr. Bangs from the Sierra Nevada de Santa Marta as identical with Merida or Bogota species can hardly be the same, although perhaps representative of them, since continuous distribution is, to say the least, improbable.

As already said in my report on the birds of this region (this Bulletin, XIII, 1900, p. 122), the fauna of the Santa Marta district (including the high Sierra and low-coast region) presents many peculiar forms, a few of them strongly differentiated from their nearest allies in neighboring regions, others their less modified representatives. This is as would be expected from its topographically isolated position, being, as Mr. Smith has expressed it, "semi-insular" in respect to its physical conditions, and has doubtless been long separated, as regards its mountainous areas, from the Andean ranges to the westward and southward. Also, as already said in another connection, "the home of many 'Colombia' species is to be looked for elsewhere than eastern Colombia," as illustrated by the case of Geoffroy's *Sciurus variabilis*, discussed later in the present paper.

Annotated List.

1. **Marmosa mitis** *Bangs.* — Fifteen specimens, as follows: Bonda, 2 adult males, March and August; 4 females and 6 young, Aug. 8–Sept. 4; Mamatoco, 1 adult female, June 1; Taganga, 1 adult female, June 25; Minca, 1 adult male, June.

"Opossum Rat. — A small grayish-brown species, found in the forest from sea-level to 4000 feet or higher. It is arboreal and strictly nocturnal, passing the day in hollow trees. The females have about eight young, which, when partly grown, are carried on her back, their prehensile tails twining about the mother's tail as she holds it arched over her body. Opossum rats appear to live mainly on insects and birds' eggs; they prowl about on the branches at night. I once caught

one as I was mothing near Valparaiso; the animal was dazzled by my lantern and I easily knocked it into my insect net. Near Mamatoco I found one in a hollow tree which it had entered through a hole ten feet above the ground; it was driven out with difficulty and could not see in the daylight.

"They use the tail to balance and steady their bodies while moving about the slender branches. A common position is transversely across the upper side of a branch, the fore feet close together and the tail passing beneath and over the branch; they seldom or never reach upward with the tail."— H. H. S.

2. **Metachirus nudicaudatus colombianus** *Allen.* — One specimen, adult male, Don Amo, April 20. (See this Bulletin, XIII, 1900, p. 196.)

3. **Caluromys cicur** (*Bangs*). — One specimen, skull only, Minca.

4. **Didelphis marsupialis colombica** (*Allen*). — Twenty specimens, all from the vicinity of Bonda, except one from Valparaiso. (See this Bulletin, XIII, 1900, p. 193; XIV, 1901, pp. 176, 186; XVII, 1902, pp. 260, 276.)

"Opossum. — Common in the dry forest and found in the mountain forest as high as 5000 feet. It is nocturnal, though sometimes moving about during the cool hours of the day. It passes the greater part of the time in trees, occasionally descending to the ground. Opossums seem to be very general feeders, eating insects, young birds, eggs, chickens when they can get them, and sometimes fruits. They make their homes in hollow trees, generally high above the ground. In Colombia the flesh is seldom eaten." — H. H. S.

The Water Opossum (*Chironectes minimus*) was taken at Santa Marta — a single specimen — by Mr. Brown (Bangs, Proc. New Engl. Zoöl. Club, I, 1900, p. 90).

5. **Bradypus tridactylus** *Linn.* — Not represented in the collection sent to the American Museum, but the skull of the specimen referred to below by Mr. Smith has been kindly loaned to me for examination by Mr. W. E. Clyde Todd, Custodian of Mammals and Birds at the Carnegie Museum. Mr. Todd has also kindly sent me a description of the exter-

nal characters (from the mounted specimen), from which and the skull it evidently belongs to the *B. tridactylus* group.

"Sloth (called *perico lijero* in sarcastic reference to its movements). — Extremely rare near Santa Marta, though sometimes found on the low lands near the river Manzanares; its low cry, said to resemble the wailing of an infant, is occasionally heard at night. Southward, beyond Rio Frio and in swampy forest adjoining the Magdalena flood plains, it is said to be more common; it does not occur in the mountains. Just before leaving Santa Marta we purchased a living specimen which had been brought from Rio Frio; we succeeded in carrying this to Pittsburgh, where it soon died. The skin and skeleton are now in the Carnegie Museum in that city. While living the animal would eat little except mangoes and bananas, which it seemed to like; it spent most of the time clinging to the back of a chair or to slats on its box; on the ground it could move only by stretching out one long fore-leg, hooking an object with its claw, and drawing its body up. Yet sloths sometimes descend to the ground in passing from tree to tree; I once found one between two trees in the forest near Santarem.

"The natural position of a sloth while feeding is either reversed, hanging from a branch by its claws, or clinging to a perpendicular branch with its head upward; in descending it goes backward. Its movements are very leisurely, but by no means as slow as they have been described.

"Sloths are very tenacious of life; I have known one to be literally riddled with seven or eight charges of shot before it loosened its hold and fell." — H. H. S.

6. **Myrmecophaga tridactyla** (*Linn.*). — Not represented by specimens. A single example was obtained at Dibulla by Mr. Brown (Bangs, Proc. N. Engl. Zoöl. Club, I, p. 89). Following are Mr. Smith's notes on its occurrence in the district.

"Great Anteater. — This animal is extremely rare in the Santa Marta mountains, though occasionally reported; the only one we heard of during our stay was seen by my son and two porters as they were passing on a mountain pass near Valparaiso, at an elevation of about 5000 feet; they had no

firearms, and as none of the party had ever seen the animal before, they hesitated to attack it with sticks; it moved down the mountain side and disappeared in the forest.

"From the notes gathered in Brazil, it appears that the great anteater is essentially a forest animal, though sometimes coming out to the open lands; it eats insects and insect larvæ of many kinds and, I believe, small fruits. The flesh is rarely eaten, and only in case of necessity." — H. H. S.

7. **Tamandua tetradactyla instabilis** *Allen.* — Fifty-seven specimens, all taken at or near Bonda. There are 6 skeletons, the rest being skins and skulls. Only two or three are positively marked for sex, but about half have external measurements, consisting of total length and length of tail. (For measurements and description see this Bulletin, XX, 1904, pp. 386–397.)

"TAMANDUA (called *soro-chuchu*). — Quite common, principally below 2000 feet, in the dry forest. It is very variable in color, but only one species is recognized by the hunters. Like the great anteater, the tamandua is essentially a forest animal, and terrestrial, rarely if ever ascending trees, though its long, hooked claws would seem to fit it well for climbing. It walks slowly and awkwardly on the sides of its feet, and is easily killed by a slight blow on the head. The animal would soon be exterminated if it were much hunted, but the meat is worthless and the skin is but little prized. Tamanduas eat termites, ant larvæ, various other insects, and certain small fruits.

"The little anteater [*Cyclopes didactylus*] is not found in the Santa Marta district; at least, none of our hunters had ever heard of it." — H. H. S.

8. **Tatu novemcinctus** (*Linn.*). — Four specimens, 1 adult and 3 very small young ones, from Bonda (2), Don Amo, and Valparaiso. Adult, total length, 711; tail, 356.

"ARMADILLOES. — A species [*Tatu novemcinctus*] is found, rarely, in the dry forest and in the open land below 2000 feet; and we obtained a single specimen of another [*Cabassous lugubris*] on an open mountain ridge above Valparaiso, at about 5000 feet.

"Armadilloes vary much in their habits and habitat, but

nearly all are found in dry forest or on open land, though wandering into the forest, where, perhaps, some species are residents; they make deep burrows, and, when alarmed, commonly dig into the ground, disappearing rapidly; if the hinder part of the body or the tail is seized before they have quite buried themselves, it is difficult to drag the animal out, so strong is the hold of their hooked claws. They make amusing pets, but are apt to be a nuisance in country houses without floors; they burrow anywhere and make exits under the walls. In captivity the smaller kinds readily eat fruit and rice; in a wild state, all or nearly all the species are partly insectivorous, and some kinds habitually burrow into termite-hills; some eat fruits, and one or two of the larger heavily armored kinds are not averse to carrion.

"The large species are never eaten. Some of the smaller kinds, especially those capable of rolling themselves into balls, are greatly esteemed as food. On the Amazon the Indians roast them in their own shells." — H. H. S.

9. Cabassous (Ziphila) lugubris (*Gray*).

Tatoua (*Ziphila*) *lugubris* MILLER, Proc. Biol. Soc. Wash., XIII, Jan. 31, 1899, 6, 8, (Santa Marta).

Cabassous hispidus BANGS, Proc. N. Engl. Zoöl. Club, I, Feb. 23, 1900, 89 (Santa Marta).

Three specimens, carapaces with skeletons, all adult males, — two from Bonda and one from Valparaiso.

The collector's measurements of two of the specimens (Nos. 14862 and 23441, Bonda) are as follows: Total length, 533, 495; tail, 159, 140; ear, 45, 62.

The skulls measure as follows:

	14862 ♂	14863 ♂ ?	23441 ♂
Greatest length	76.5	72	74
Basal length	70	65.5	66.5
Zygomatic breadth	39	39	38.5
Mastoid breadth	37	36	34
Interorbital breadth	24	25	24
Depth of occiput	27	27	26
Length of nasals	25.5	23	24
Palatal length	46	43	43
Length of mandible	56	55	56.5
Upper toothrow	30	28	28
Lower toothrow	25	26	26

Through the kindness of Mr. Witmer Stone, I have been able to compare two of the Cope series of specimens of *Cabassous hispidus*, now in the Museum of the Philadelphia Academy of Natural Sciences, and also an additional skull in this Museum, from Chapada, Matto Grosso, Brazil, with the present series. The Philadelphia Academy specimens are the specimens used by Mr. Gerrit S. Miller, Jr., in the preparation of his paper entitled 'Notes on the Naked-tailed Armadillos' (Proc. Biol. Soc. Wash., XIII, pp. 1–8, figs. 1, 2, Jan. 31, 1899). A critical comparison of this material leads me to accept Mr. Miller's conclusions as against those of Mr. Bangs — namely, that the Santa Marta form is not only specifically but subgenerically separable from *C. hispidus*. Externally the Santa Marta form closely agrees with the Central American *C. centralis* (Miller), but differs greatly in the form of the skull. The differences in the form and number of plates in the head shield, the size and form of the ears, the absence or presence of minute bony plates on the posterior surface of the ears, are among the obvious distinctions between the *C. hispidus* and the *Ziphila* groups, as already made clear by Mr. Miller. The comparatively naked ventral surface and the almost entire absence of bristles at the posterior edges of the plates of the carapace (except on the lower lateral rows) is another feature of contrast between *C. hispidus* and the *Ziphila* group.

It is not, however, so clear that the Santa Marta animal should take the name *lugubris*, the type locality of which is "St. Catherines, Brazils." In the absence of specimens of true *C. lugubris*, however, for comparison, this name is here provisionally accepted, although the presumption is, on geographical grounds, that the Santa Marta animal is different from true *lugubris* from southern Brazil.

The normal dental formula in the *Ziphila* group appears to be $\frac{9}{8} - \frac{9}{8} = \frac{18}{16}$; but in two specimens out of three in *lugubris* there is an extra tooth in the right upper toothrow, as follows:

No. 14862, dental formula, left side, $\frac{9}{8}$; right side, $\frac{10}{8}$.
" 14863, " " " " $\frac{9}{8}$; " " $\frac{10}{8}$.
" 23441, " " " " $\frac{9}{8}$; " " $\frac{9}{8}$.

This extra tooth is small, and stands at the front end of the toothrow. In a specimen of *C. hispidus* there is also an extra upper tooth on the right side, but in this case it is a small tooth at the posterior end of the toothrow.

10. **Trichechus manatus** *Linn.* — Although not represented in the collection the following is of interest.

"MANATEE. — Found along the coast, especially about the mouths of the rivers Buritaca and Don Diego, and other rivers further east; when the waters are high they enter these streams to feed on the grass. In August and September, when the sea is generally calm, parties of fishermen go down from Santa Marta and Taganga to fish for manatee; the animals are harpooned from large canoes. In September, 1899, we made a trip to the Buritaca on purpose to get manatee; but the object was frustrated by unusually heavy winds and high seas, making fishing impossible. Several of the animals were seen as they came to the surface, a quarter-mile from the beach. The manatee seems to be purely herbivorous in its diet, eating grass, and perhaps algæ. Its flesh is much esteemed." — H. H. S.

12. **Tagassu torvum** (*Bangs*). — Thirty-five specimens, as follows: 12 skins with skulls; 3 skins with skeletons; 2 skins without skulls; 13 skulls without skins; 4 skeletons without skins. About 20 were taken at Naranja, 6 at Bonda, 3 at Quebra Mojada, and others (mostly without data) at these or neighboring localities. The greater part were taken in January and July; others in March, August, October, and December. They are all adult except two half-grown young. Unfortunately the sex of the specimens is not indicated, nor were external measurements taken, the specimens having been killed and skinned by native hunters.

In describing this species (from a single adult male), Mr. Bangs gave no account of its external characters, beyond saying: "Size smaller than in either *T. tajacu* of southern Brazil or *T. angulatus* of Texas. Color and external characters as in these two species." The present large series, however, on comparison with some thirty or more specimens of the *angulatum* group from Mexico and the southern border

of the United States, shows that the coloration in the two groups is strikingly different. The absence of skins from southern Brazil prevents comparison of the external characters of *torvum* with those of *tajacu*, as now restricted, but below will be found a comparison of their cranial characters.

In general effect the color of *T. torvum* is a grizzle of ochraceous buff, white, and black, the mid-dorsal region being black and white with a tinge of buff, becoming yellowish gray finely varied with black on the sides, and strong yellowish buff on the ventral surface and inner surface of the limbs, slightly punctated with brownish black. Black prevails on the median dorsal area, forming a more or less well defined vertebral black stripe, with part of the bristles wholly black and part black barred with white, the black being most developed on the crown, nape, and shoulders, and more mixed with white posteriorly. The hairs individually, except near the median line, are ringed with alternate bands of black and fulvous white, about two of each to each bristle. The fulvous tint forms merely an indistinct border to the white bars. The tips of the bristles are usually black but a part are tipped with yellowish white. The head, except a median blackish face stripe, is usually much more strongly suffused with yellowish buff than the body, particularly on the sides of the face and between the eyes and the base of the ears, this strong buffiness or rusty yellow cast of the head, in contrast with the middle region of the back, being a conspicuous feature of the species as compared with any of its northern allies. The strongly marked ochraceous buff collar is another prominent and very constant feature, formed by the two shoulder bands, which begin on the throat and extend posteriorly and upward, nearly meeting over the shoulders. Feet and anterior surface of limbs blackish brown; chin blackish, and a median blackish band on the face.

Unfortunately, as already stated above, there are practically no external measurements, the specimens having been taken by native hunters and skinned without being measured or any record being made of the sex. The total length is given for two adults as, respectively, 914 and 927 mm.

Taking the skulls as a basis for comparison, *T. torvum* and *T. tajacu* do not differ appreciably in size, as shown by the subjoined tables of measurements, but they are readily separable on other cranial characters, notably by the difference in the facial angle, through the greater depth of the occipital portion of the skull. With the total length and zygomatic breadth absolutely the same (in the average) in both, the depth of the occiput (top of the occipital crest on the median line to lower border of occiput) in *T. tajacu* is 80 mm. and in *T. torvum* 74.5 mm. This gives, approximately, a facial angle of 55° for *tajacu* and a facial angle of 64° for *torvum*. In addition to this, the audital bullæ are slightly larger and the dentition is appreciably weaker in *tajacu* than in *torvum*, as shown in the subjoined tables. On the other hand, *T. torvum* is much like the northern forms of the genus (*angulatum* and allies), but the skull is very much smaller, and, as already shown, the coloration is distinctly different.

The type locality of *T. tajacu* being Paraguay, the Chapada (Matto Grosso, Brazil) series of skulls here used as representing that species is presumably typical, Chapada being close to the northern border of Paraguay. They were collected by Mr. Herbert H. Smith in 1885. All the skulls in both tables are fully adult, but the teeth in some of the Chapada specimens are a little more worn than they are in any of the specimens of the Santa Marta series. None of them has the sex indicated.

One of the specimens of the Chapada series (No. 326) presents an interesting dental abnormality, namely, a supernumerary molar on the right side of the palate, situated opposite the junction of m^2 and m^3, wholly internal to the toothline. It has the crown structure of p^1, but is larger, about equalling p^2.

MEASUREMENTS [1] OF 8 SKULLS OF *Tagassu torvum*, FROM SANTA MARTA, COLOMBIA.

Mus. No.	Total length.	Basal length.	Zygom. breadth.	Postorb. breadth.	Depth of occiput.	Upper toothrow.	M^2.	Rostrum.	Middle upper incisors.	Bulla.
14676	228	193	99	74	73	65	13. x 13.	25	17.5	25 x 23
14677	239	201	102	75	78	68	13.3 x 13	27.5	20	26.6 x 23
14679	206	175	97	69	72.5	63	13.5 x 12.3	25.5	18	21 x 22.5
14681	223	184	—	67	75	65.5	14 x 12	26	18	20.5 x 20
14875	224	186	93	63	74	69	13.5 x 13	26	19	20 x 19
23527	236	197	101	78.5	76.5	66	13.3 x 14	28	19	22 x 23
23529	231.5	195	96	73	76	65.5	13 x 12.3	26.3	19	23 x 22
23532	220	183	102	73	71	66.2	14 x 13	25	17	23 x 20
Average...	226	189	98.7	71.6	74.5	66.3	13.5 x 12.6	26	18.4	22.6 x 21.6

MEASUREMENTS [1] OF 10 SKULLS OF *Tagassu tajacu*, FROM CHAPADA, BRAZIL.

Mus. No.	Total length.	Basal length.	Zygom. breadth.	Postorb. breadth.	Depth of occiput.	Upper toothrow.	M^2.	Rostrum.	Middle upper incisors.	Bulla.
322	231	190	101	70.5	85	65	14 x 11.5	26.5	18.5	23 x 22
323	233	188	98	72	73	60	12 x 11	26	16.6	24 x 21.5
324	230	187.5	98	72	80	62.3	12.5 x 11.5	27.5	19.6	24 x 20
325	220	189.5	98	66	76	58	11 x 11.3	24	18	24 x 20.5
326	218	177	96.5	67.5	81	61	12 x 11	27	17.3	22 x 20
327	226	186.5	93	64	78.3	63.5	13.5 x 13	25.5	18	24 x 22.3
328	222	182	96	72	81	56	10.5 x 11	26.5	16.5	22 x 21
329	223	183	100	71	84	59	12 x 12	26.3	17.5	23.5 x 22
330	233	197	104	70.5	83	65	13 x 12	26	19	22 x 23.5
386	227	188.5	104	74	81	64	13 x 13	27	19	24 x 21
Average	226	187	98.8	70	80	62.4	12.4 x 11.7	26	18	23.3 x 21.4

[1] *Explanation of Measurements.*

Total length = front edge of premaxillaries to edge of occipital crest.
Basal length = inner base of incisors on the midline to posterior border of condyles.
Zygomatic breadth = at most expanded part of zygomatic arch.
Postorbital processes = between extreme external points.
Depth of occiput = top of occipital crest on median line to lower posterior border of basioccipital.
Rostrum = width in front of canines.
M^2 = length of crown on median line x greatest breadth of tooth.
Middle upper incisors = transverse breadth of alveolarline.
Bulla = greatest length x greatest width

13. **Tagassu (Olidosus) pecari** (*Fisher*). — Twenty-six specimens, as follows: skins with skulls, 15; skin with skeleton, 1; skins without skulls, 8; skeletons without skins, 2; skulls without skins, 6. Three were taken at Calavasa, the others at Naranja; 7 were collected in January, 4 in March, 3 in July, 3 in August, 2 in October, 1 in December, and 5 are without date.

All are adult except 5; these include four young a few days old and one young about one fourth grown. Only three have the sex indicated, and two only have external measurements, as follows:

Females, Nos. 14871 and 14872, total length, for each, "3 ft. 7 in." (992 mm.).

MEASUREMENTS [1] OF 9 SKULLS OF *Tagassu pecari* FROM SANTA MARTA, COLOMBIA.

Mus. No.	Sex.	Total length.	Basal length.	Zygom. breadth.	Postorb. breadth.	Depth of occiput.	Upper toothrow.	M^2.	Rostrum.	Middle upper incisors.
15464		268	230	112.5	87	89	78	15 x 13	37.5	20.
14874	♀	270	230	116	96	98	78.5	17 x 14	37.5	23
14684		274	235	117	90	97.5	77	15.5 x 14	38	22
14686		259	225	111	87	91	75	16 x 14.6	36	22
14872	♀	267	223	104	87	92	73	15 x 13.5	36.5	22
14688		267	234	115	91	91	75	15 x 13.3	37.5	21
14683		252	214	109	88.5	86	74.5	16 x 13	36	23
15465	♂	268	228	110	87.5	90	90	16 x 14	35.5	22
14687		267	225	105	85	88	74.5	15 x 13	35	21
Average....		260	227	111	88.7	91	77	15.6 x 13.6	36.6	21.8

In the absence of specimens of *Olidosus* from other localities no comparison can be made between the present and allied forms.

The adults of the present series are black, more or less varied with rufous, the amount of rufous varying in different specimens. On the body the hairs are mainly wholly black, mixed with others ringed or tipped with rufous; on the sides of the head the rufous is generally a conspicuous feature of

[1] For explanation of measurements see p. 426. Measurements of the audital bulla are omitted, since the length cannot be given, the posterior part of the bulla being concealed by the overlying exoccipital.

the coloration, and is more or less prominent on the neck and shoulders. The nose, chin, and throat are soiled whitish, the white extending back as a broad band along the sides of the mouth and on the sides of the neck as far as the ear.

The newly-born young are rufous, with a median dorsal black stripe, from the occiput to the hips. The rufous of the head and body is more or less varied with black, the individual hairs being in part wholly rufous and in part rufous ringed or tipped with black. The nose, chin, and sides of the face are uniform rufous, like the body, showing none of the whitish tint that has given to the adults the name White-lipped Peccary. The rufous of the young in first pelage is gradually replaced when the animal is about one fourth grown by the black pelage of the adult.

One of the most striking peculiarities of the subgenus *Olidosus* appears hitherto to have escaped notice, namely, the form and position of the audital bulla. In the subgenus *Tagassu* the bulla is fully exposed posteriorly, and is subtriangular in outline, with a sharply convex antero-internal angle, a slightly convex internal border, a short obliquely truncated outer angle, and a broad oblique posterior face, abruptly prolonged internally to form a swollen projection, leaving a deeply concave surface on the posterior plane. In *Olidosus* the posterior conical projection is greatly produced, and the postero-external third (nearly one half in old specimens) is covered and concealed by the downward projection of the exoccipital, producing a very different outline for the exposed portion of the bulla, which is greatly more extended posteriorly.

"Wild Hogs. — The two species distinguished here as *puerco* [*Tagassu pecari*] and *saina* [*Tagassu torvus*] are both common, especially in the dry forest near the coast; they range certainly to 4000 feet, and probably higher. Puercos go singly or (usually) in pairs, or the sow with her pigs; the sainas commonly go in bands of four to ten. Both are eaten, but the meat is unpleasant unless the scent gland is cut out immediately after death. They are commonly hunted with dogs and are often dangerous game, especially the sainas when the bands are large. They wander both by day and night,

often seeking streams and pools where they can wallow. Their food consists largely of forest fruits, but they are as omnivorous as domestic swine, eating roots, grubs, fish thrown up on the beach, and so on.

"The saina sows have four, six, or more pigs in a litter; the puercos seldom more than three or four. We tried vainly to rear the young; they were readily tamed, but soon died, no doubt because of the changed diet.

"Both the saina and puerco are much infested with the larva of a fly (Œstridæ, called *gusano* here) which burrows under the skin and causes running sores. These larvæ also attack monkeys, dogs, and other animals, as well as man." —H. H. S.

14. **Mazama memorivaga** *F. Cuvier.* — Twenty-one specimens (skins and skulls), and several additional skeletons, as follows: 6 adult males, 12 adult females, 2 half-grown females, and 1 fawn in spotted coat; all taken in the immediate vicinity of Bonda, as follows: Jan. 12 and 13, Feb. 10, March 5, 23, and 28, April 21, June 21 and 22, July 6, Oct. 12 and 13, and Dec. 20. Only six have external measurements, and these give only the total length, the length of the tail, and the girth of the chest and neck. While girth measurements are useful to the taxidermist as an aid in mounting specimens, they are hardly citable in the present connection.

The total length for 3 males is given as: 1118, 1146, 1154; length of tail for the two last, 86, 89. The measurements given for a single female are: Total length, 1168; tail, 127.

Five adult male skulls and 7 adult female skulls measure as follows:

14643, ♂,	gr. length,	185;	gr. breadth,[1]	82;	up. toothrow,	57;	antler,	95.
14640, ♂,	" "	184;	" "	81;	" "	60;	"	109.
14685, ♂,	" "	182;	" "	83;	" "	57;	"	83.
14645, ♂,[2]	" "	180;	" "	81;	" "	55;	"	58.
24378, ♂,	" "	178;	" "	85;	" "	55;	"	113.
14642, ♀,	" "	186;	" "	81;	" "	58.		
15486, ♀,	" "	179;	" "	80;	" "	58.		
14864, ♀,	" "	178;	" "	78;	" "	55·5.		
14646, ♀,	" "	175;	" "	75;	" "	53·5.		
14638, ♀,	" "	174;	" "	80;	" "	56.		
23476, ♀,	" "	179;	" "	75;	" "	57.		
23479, ♀,	" "	179;	" "	81;	" "	56.		

[1] At lower edge of orbits; the zygomatic breadth is 2 to 4 mm. less.
[2] The oldest and also the smallest of the series of males.

The tarsal gland and tuft are present in all the specimens of this series, but they are much smaller than in *M. rufa*, the erect stiff hairs of the tuft proper covering an area of about 12 by 16 mm.; the hairs are very stiff and short, dark brown, with often a small central whitish spot. In *M. rufa* the area covered by the tuft is very much larger — about 25 by 25 — and the hairs are softer, longer, and light yellowish brown.

The present series, although consisting of specimens taken in nearly every month of the year, shows little color variation that can be attributed to season. February, June, and October specimens differ very little in coloration, or in the fulness or length of the pelage. There is, however, considerable individual variation, two specimens (one taken April 21 and the other Oct. 12), being much lighter colored than the others. These have the general color yellowish rufous, the yellowish tips of the hairs being much longer and brighter yellow than usual. The cap of long hairs on the head is in some specimens dark brown, in others dark yellowish rufous.

"This species ranges from sea-level to 4000 or 5000 feet, living properly in the forest, but coming out to graze on the open lands at night. It is not very common in the district explored. These deer are not gregarious, but go singly or in pairs, or the female with her fawn. They are rather nocturnal than diurnal, though they see well enough during the day in the forest shades." — H. H. S.

15. **Tapirus terrestris** (*Linn.*). — Three specimens, two adults, with skeletons, and one in the immature spotted dress, Cacagualito.

"The tapir is common from the sea-coast to 6000 feet, and probably higher, as I have seen tapir tracks at nearly 8000 feet. They go singly or in pairs or families, wandering both during the day and at night, and often seeking streams, where they love to bathe themselves in the cool water; they are said to swim well. The food consists of leaves, young twigs, grass, and fruits. They are properly forest animals, rarely coming out to the open lands at night. In passing through thickets they make their way by sheer strength, breaking or bending the branches; and they can often be tracked by the

noise made; though such heavy animals they can run rapidly even where the growth is tangled. Tapirs see badly, at least during the day, but they are very keen-scented.

"The female tapir has, generally at least, only one young at a birth. The animals are much hunted for their meat, which is excellent, much like beef. In southern Brazil and Argentina the hide is greatly prized for lariats, halters, and other works requiring great strength; it is thick, white, and very strong, and competent judges pronounce it almost equal to hippopotamus hide. In Colombia little use is made of it. As tapirs are easily domesticated, and will feed about a house like swine, it would probably pay well to breed them.

"All the hunters near Santa Marta aver that there is a tapir, found in the mountain forest, which, in general color, resembles *T. americanus*, but has a broad white mark over the shoulders. This information was given without any leading questions, and the hunters knew nothing about the Malay tapir, which by their description this one resembles. . . . I can hardly refuse to believe these reiterated and sober statements, made by my men who had no motive for inventing the story, and who would be incapable of inventing a new species so much like the eastern form. I offered a large reward for a specimen, but failed to obtain one, and can only give the story as I heard it. It seems probable that this region has an undescribed tapir, which differs in color from all the known American species, and resembles that of the Malay Islands." — H. H. S.

16. Sciurus saltuensis (*Bangs*).

Sciurus variabilis saltuensis Bangs, Proc. Biol. Soc. Washington, XI, 1898, 185. Nov. 16, 1898. Pueblo Viejo, Colombia (alt. 8000 ft.)

Six specimens: Valparaiso, 4, May 24–31 and June 13; Sierra El Libano, 1, May 24; Don Diego, 1, May 8. Four of these are very dark, quite unlike the coast form (*S. saltuensis bondæ*), and seem to typically represent the mountain form named *saltuensis* by Mr. Bangs. The fifth specimen is quite like examples in corresponding pelage from the coast region.

"Common, ranging from sea-level to 6000 feet or higher.

As shown by Dr. Allen [this Bulletin, XII, 1899, pp. 214–216], the color of the upper parts varies from red, more or less bright, to dark olivaceous; he considers the former a breeding and the latter a summer or post-breeding pelage. My strong impression, however, is that the depth of coloring is connected in some way with the habitat. We observed that specimens shot near sea-level [*Sciurus saltuensis bondæ*] were generally red, no matter in what month they were found; while those from the mountains [*Sciurus saltuensis*] were commonly dark at all seasons; the rule, however, is not invariable, as we have some dark ones from near the coast and a few bright red ones from the higher mountains. At Minca (2000 feet) the two varieties were about equally common in May. It may be well to note that our first collections were from Bonda, and nearly all the squirrels were red; as dark ones were brought in we noted the difference and always saved such specimens if we could, while often rejecting the red ones. Consequently the collection does not give a correct idea of their relative abundance." — H. H. S.

17. **Sciurus saltuensis bondæ** *Allen.* — Sixty specimens, including large series of adults of both sexes, and a number of young specimens of various ages, all collected at Bonda except two, taken at Minca. More than half were collected in July, and most of the others late in June or early in August, the months from November to May being represented by only from 1 to 3 specimens each. Many of the specimens are in moult, and the gradual change of pelage can readily be traced.

This squirrel, like many others, is subject to a wide range of seasonal variation in color. In all specimens the ventral surface is pure white, the white extending forward to the posterior border of the throat, and down the inside of the limbs as a narrow band — on the fore limbs ending about half way between elbow and wrist; on the hind limbs, about half way between knee and heel. The rest of the pelage varies from intense bright rufous to olivaceous, except the tail, which is always deep red, the basal portion excepted, which latter varies in color with the season, like the rest of the dorsal pelage. The brilliant rufous phase is evidently the

'winter' or breeding pelage, in which the hairs are long, shining intense uniform rufous, without annulations of black, shown in perfection by only about one specimen in ten of the present series. The olivaceous phase is the opposite extreme, the post-breeding pelage, shown in perfection by still fewer examples. In this pelage the whole dorsal area, including the head, flanks, feet, and the basal inch and a half to two inches of the tail,— all of the body pelage except the fulvous chin and throat and the white of the belly and inside of the limbs and the apical three-fourths to four-fifths of the tail,— is olivaceous, the hairs individually being dark plumbeous for the basal third, then fulvous narrowly ringed subapically with black, giving an olivaceous general effect. The change, as usual, begins on the feet, soon involving the inside of the fore arms and inside of the thighs, and later the whole of the fore limbs and outside of the shoulders; simultaneously there is also developed a bright rufous lateral line; the new pelage now rapidly advances up the sides of the chest and shoulders, meeting on the median line and then extending forward over the head and backward to the base of the tail, the rump, basal portion of the tail, and the top of the head being the parts last to acquire the brilliant rufous of the breeding pelage. The greater part of the specimens of the present series (taken at various dates from June 20 to August 3, but nearly all in July) are in various stages of the change, often showing a clear and unmistakable line of demarkation between the two pelages. The most olivaceous specimen of the series was taken March 12; the most intensely and uniformly rufous specimens were taken July 4, 6, and 29. The seasonal change in color, through moult, is perfectly parallel to that in the North American *Sciurus hudsonicus* group.

There is evidently considerable individual variation, and it seems probable that many specimens never reach the complete intense stage of rufous, but have the hairs of the head, lower back, rump, and the base of the tail red, subapically ringed narrowly with black, the black annulations being more or less visible as a part of the surface color. The tail hairs are generally uniform deep red from tip to base, but in quite

a number of specimens many of them show a distinct band of black, more especially on the apical third of the tail, where there is sometimes developed a rather prominent narrow zone of black, distinctly visible on the lower side of the tail without parting the hairs. There is much reason to suppose, however, that the presence or absence of black in the tail is a seasonal feature, and that the wholly red tails go with the red body pelage and the mixed black and red tails with the olivaceous post-breeding dress.

The first pelage of the young is of the olivaceous annulated type, with, however, the general effect more rufous, and the tail hairs wholly red. Most of the young (about quarter-grown) specimens were taken the last of June and during the first week of July, but one is labelled Nov. 18, showing that the season of reproduction, and also of moult, is subject to much individual variation. (For measurements, and further remarks on seasonal changes and individual variation, — here somewhat modified by more detailed study of a greater amount of material, — see the original description of the subspecies, this Bulletin, XII, 1899, pp. 213–217.)

Mr. Bangs (Proc. Biol. Soc. Wash., XII, 1898, p. 183; Proc. New Eng. Zoöl. Club, I, 1900, p. 91) has considered the squirrels "from the lowlands of the Colombian coast as strictly typical *Sciurus variabilis*," a conclusion to which I have already taken exception (this Bulletin, XII, 1899, p. 216). At the time we both wrote it was presumed that the type region of this species was Colombia, on the principle of exclusion; but Mr. Bangs assumed the Santa Marta region to be the type locality, while the non-agreement of Geoffroy's description and colored figure with the Santa Marta series led me to believe that the real type locality of *S. variabilis* must have been somewhere in the western part of Colombia. On going over the subject again I still find it impossible to make Geoffroy's description and figure fit the Santa Marta animal. His figure shows a squirrel with the posterior fourth of the dorsal surface deep rufous, in strong contrast with the more anterior part of the dorsal region, and the basal two-thirds of the tail mainly black, a condition in both

respects entirely at variance with any of the phases of the Santa Marta squirrel. His description applies in a general way very well to some phases of the body pelage of this animal. But his account of the tail, the hairs of which, he says, are always black at their origin and red at their extremity, and that the tail, owing to the distichous arrangement of the hairs, is much blacker on the posterior face than on the anterior,[1] is entirely opposed to anything seen in the Santa Marta animal. Besides, there is evidence that M. Plée's journey in Colombia was up the Magdalena River. Schlegel says, in his 'Simiæ' (Mus. Pays Bas, VII, p. 184), under *Ateles hybridus*: "On sait, par les observations du voyageur Roulin . . . que ce singe est très commun dans la vallée du fleuve Madelaine en Colombie. Les individus du Musée de Paris proviennent, à l' exception d'un seul, du voyage de Plée. Un des notres a également été recueilli par ce voyageur." And in his list of specimens of this species he says: "1. Femelle à l'âge moyen, voyage de Plée, Colombie, acquise en 1834 du Musée de Paris." It is probable — perhaps almost certain — that the squirrels, collected by M. Plée, on which Geoffroy founded his *Sciurus variabilis*, came also from the Magdalena River in Central Colombia, — a very different region zoölogically from the Santa Marta coast district, and hence the squirrel named *variabilis* would naturally differ from the Santa Marta form. Indeed, it seems now safe to assume that the real type locality of *S. variabilis* is the Magdalena River of Colombia, at some point quite remote from the coast, in the region inhabited by *Ateles hybridus*, which we know is not found in the Santa Marta region.

18. **Mus alexandrinus** *Geoffroy*. — Five specimens, Onaca, Sept. 2, and El Libano (alt. 6500 feet), June 29 and July 1. Three out of the five specimens are more or less mixed with the *Mus rattus* stock, only one being a normal *M. alexandrinus*.

19. **Mus musculus** *Linn.* — Three specimens, Taguaga,

[1] "La même remarque est applicable aux longs poils de la queue toujours noirs à leur origine et roux à leur extrémité. Mais il résulte de la disposition distique de la queue qu' elle est toujours beaucoup plus noire à la face postérieure qu'à l'antérieure." — *Is. Geoffroy*, Mag. de Zool., 1832, Classe I, pl. 4, 5, 6, [p. 3].

June 23 and 24. These are rather more fulvous, both above and below, than average specimens from the United States.

"House Rats. — Apparently the only common species is the roof rat; this is abundant in all the settlements and is sure to invade new clearings soon after they are started; it was often trapped in old clearings half a mile or more from houses. The only other species we heard of is the house mouse which occurs at Santa Marta, but it is not abundant."—H. H. S.

20. **Oryzomys maculiventer** *Allen.* — Fifty-two specimens, skins and skulls, and 10 skeletons and skulls, mainly from El Libano and Valparaiso. (See this Bulletin, XII, 1899, p. 204.)

Since this species was first described I have had the opportunity to make direct comparison of a series of specimens of it with *O. meridensis* Thomas, to which *O. maculiventer* has been referred by Mr. Bangs, and find no difficulty in distinguishing the two forms. Though closely allied, they are easily separable.

"This is the commonest species in the San Lorenzo Mountains, from about 4000 to 6000 feet. We found their holes commonly in rocky places, in crevices of the stone; sometimes under stumps or logs." — H. H. S.

21. **Oryzomys illectus** (*Bangs*). One specimen, adult, Don Diego, May 9.

This species was considered by Mr. Bangs to be a subspecies of *O. flavicans* Thomas, from Merida, Venezuela. With a large series of topotypes of *O. flavicans* before me, I have no hesitation in considering the two forms as specifically distinct, especially as it is highly improbable that their ranges can be continuous.

22. **Oryzomys (Zygodontomys) sanctæmartæ** *Allen.*—Eight specimens, Mamatoca, and vicinity. (See this Bulletin, XII, 1899, p. 207).

23. **Oryzomys magdalenæ** *Allen.* — Two specimens, Minca and Valparaiso. (See this Bulletin, XII, 1899, p. 209.)

24. **Oryzomys villosus** *Allen.* — Two specimens, Valparaiso and Don Diego. (See this Bulletin, XII, 1899, p. 210.)

25. **Oryzomys mollipilosus** *Allen.* — Eleven specimens, of which only 5 are adult, collected as follows: Valparaiso, 6, of which 3 are adult; Don Diego, 4, of which only 1 is adult; Minca, 1. (See this Bulletin, XII, 1899, p. 208.)

Mr. Bangs gives *O. laticeps* (Lund) as occurring abundantly at 8000 feet in the Santa Marta Mountains. The three preceding species (*O. magdalenæ*, *O. villosus*, and *O. mollipilosus*) have been compared with authentic specimens of *O. laticeps* in the British Museum, and all prove to be decidedly different from *O. laticeps*. While closely related *inter se*, they are readily distinguishable by the characters already given.

26. **Oryzomys trichurus** *Allen.* — Five specimens, 3 adults and two young, from Bonda and immediate vicinity. (See this Bulletin, XII, 1899, p. 206.) The tail varies greatly in amount of hairiness, in two specimens the tail being scantily clothed, and in the third (the type) heavily clothed. Possibly more than one species is represented by these specimens.

27. **Oryzomys (Melanomys) columbianus** (*Allen*). — Seven specimens; 6 from Manzanares and 1 from Minca. (See this Bulletin, XII, 1899, p. 203.)

A reëxamination of these specimens shows that the original reference of this species to *Akodon* was erroneous. While Akodont in many features, it is better referred to *Oryzomys*, as a member of Thomas's subgenus *Melanomys*, proposed for *O. phæopus* and its near allies.

Mr. Bangs reports *Rhipidomys venezuelæ* Thomas from the Santa Marta Mountains, but there is no representative of this genus among the Muridæ of the Smith Collection. My *O. trichurus* is not a *Rhipidomys*, as suggested by Mr. Bangs (Proc. N. Engl. Zoöl. Club, I, 1900, p. 94).

28. **Sigmodon sanctæmartæ** *Bangs.* — Ninety specimens, skins and skulls, and 7 additional skeletons, of which about one half were collected at Minca, at altitudes varying from 100 to 2000 feet, and the rest at Bonda, Onaca, and neighboring localities at altitudes varying from 100 to 500 feet.

In coloration and general external appearance, *S. sanctæmartæ* greatly resembles *S. borucæ* from Costa Rica, and *S. bogotensis* from Bogota, Colombia; nor is there apparently

very much difference in size or proportions, as shown by the following measurements of 38 adults (the females all show marks of having suckled young) from the Santa Marta district.

			Total length.	Tail vert.	Hind foot.
Bonda and Onaca,	7 spec.	♂	280(254–302)	122 (113–130)	34 (30–38)
" " "	3 "	♀	283(264–298)	118 (111–127)	32.3(30–35)
Masinga Vieja,	7 "	♂	303(275–320)	127 (122–145)	35 (33–37)
" "	4 "	♀	294(270–305)	127.5(123–130)	34.7(33–36)
Minca,	8 "	♂	276(260–303)	122 (113–132)	31 (29–35)
"	9 "	♀	265(254–291)	116 (103–120)	31.5(29–35)
S. borucæ,	Type	♀	275	115	32
S. bogotensis,[1]	8 spec.		275	100	33

The pelage in *S. borucæ* is much softer and less hispid than in the Santa Marta form, and the general color is less ferruginous. These features are much more strongly evident in the young in first pelage than in the adults, the contrast in color between the young examples in the two series being very marked; the young of *S. borucæ* are rusty brown while the others are much darker, having only a slight fulvous wash in place of the strong rusty wash in *S. borucæ*. The ear is also very much larger in the Santa Marta form than in *S. borucæ*, and less heavily clothed.

[Since the manuscript of this paper was sent to the printer Mr. Outram Bangs, Curator of Mammals at the Museum of Comparative Zoölogy, Cambridge, Mass., has generously sent me, in response to my request for certain specimens, nearly all of the Santa Marta Muridæ (only the genera *Sigmodon* and *Mus* being omitted) collected by Mr. W. W. Brown for collation with the Muridæ of the Smith collection, with the request that I should describe any species that might prove new. It is needless to say that such courtesy is greatly appreciated; and the following is submitted as a supplement to the foregoing enumeration of the Muridæ of the Smith collection.

Of the 9 species of indigenous Muridæ recorded by Mr. Bangs as collected by Mr. Brown, 5 are represented in the Smith collection, the other 4 being apparently not found in the region explored by Mr. Smith's collectors. On the other hand the Smith collection contains 4 not obtained by Mr. Brown, making a total of 13 species of Muridæ thus far recognized from the Santa Marta region. The following is a collation of the two collections.

[1] Measurements approximate, from skins.

Rhipidomys venezuelæ Bangs (Proc. New Engl. Zoöl. Club, I, 1900, p. 92). — Not represented in the Smith collection. The 9 specimens sent for examination were taken in the Sierra Nevada at altitudes of 3000 to 8000 feet. On comparison of this series with eleven topotypes of true *R. venezuelæ* from the mountains of Merida (altitude about 4500 feet), the two series are distinguishable at a glance, the Sierra Nevada specimens being much redder than the Merida series, including the immature specimens as well as the adults. The general color above, instead of being dull grayish fulvous as in *R. venezuelæ*, is reddish brown, varying in different specimens from fulvous to rufous. Individual specimens from the two series can be very closely matched, but the two series when compared collectively are decidedly different. A comparison of the collectors' measurements shows very little difference in size, nor is there any appreciable difference in cranial characters.

Oryzomys meridensis Bangs (*l. c.*, p. 92). — This, as Mr. Bangs supposed, is my *O. maculiventer*, which, while a member of the *meridensis* group, proves to be satisfactorily distinct on comparison of topotypes of the two forms, as noted above.

Oryzomys laticeps Bangs (*l. c.*, p. 93). — Of the 13 specimens sent for examination 12 are from Pueblo Viejo (alt. 8000 ft.) and 1 from Palomino (alt. 5000 ft.). This is my *O. mollipilosus* from Valparaiso (alt. 4500 ft.) in the San Lorenzo Mountains. The younger specimens are practically indistinguishable from the original specimens (young adults) of *O. mollipilosus*, but the old specimens, with much worn teeth, are larger and paler with coarser pelage.

A careful study of Mr. Bangs's fine series leads me to question the distinctness of my *O. magdalenæ* from *O. mollipilosus*. My *O. villosus*, also from Valparaiso, is, however, very distinct from *O. mollipilosus*, being easily distinguishable by its large, naked ears, and strongly marked cranial characters.

Oryzomys flavicans illectus Bangs (*l. c.*, p. 94). — As noted above, this is quite different from true *O. flavicans* Thomas, from Merida, and should stand as *O. illectus* Bangs. The series of 8 specimens sent me by Mr. Bangs, nearly all from Pueblo Viejo (alt. 8000 ft.), is strikingly different from a series of 20 topotypes of true *O. flavicans;* no specimens in the two series can be found that approach each other very closely, especially in the color of the underparts. The coloration of *illectus* is very much deeper throughout, being very much more rufous above, and orange buff below instead of nearly clear white. It is also much larger. The differences in coloration are parallel to those between *Rhipidomys venezuelæ* of Merida and the Sierra Nevada, but very much greater. A comparison of the skulls of *O. flavicans* and *O. illectus* shows that the two forms are by no means closely related, *O. illectus*

having much shorter and smaller palatine foramina, larger bullæ, broader postpalatal fossa, etc., than *flavicans*.

As noted above, there is only a single specimen of this species in the Smith collection, taken at Don Diego in the San Lorenzo Mountains. My *O. trichurus*, from the coast at Bonda, which Mr. Bangs (*l.c.*, p. 94) considers to be probably a compound of *R. venezuelæ* and his *O. flavicans illectus*, is not only not a *Rhipidomys*, but has no close — only a congeneric — relationship to *O. illectus*.

Oryzomys (*Oligoryzomys*) *navus* Bangs (*l. c.*, p. 95). — Not represented in the Smith collection.

Oryzomys (*Oligoryzomys*) *dryas humilior* Bangs (*l. c.*, p. 95). — Not represented in the Smith collection.

Oryzomys (*Zygodontomys*) *phæopus obscurior* Bangs (*l. c.*, p. 95.) — This is my "*Akodon*" *columbianus* (see above, p. 437).

Oryzomys (*Erioryzomys*) *monochromos* Bangs (*l. c.*, p. 97). — Not represented in the Smith collection.]

29. **Heteromys jesupi** *Allen*. — Twenty-two specimens, from seven localities ranging in elevation from sea-level to about 2000 feet. (See this Bulletin, XII, 1899, p. 201.)

30. **Proechimys mincæ** (*Allen*). — One hundred and twenty-five specimens, skins and skulls, and 14 additional skeletons and several skulls, about two thirds of which were taken at Minca and the rest at or near Bonda. They include a large number of adults of both sexes and young of all stages of immaturity. There is, however, little to add to the account of the species already given. (See this Bulletin, XII, 1899, p. 198.)

31. **Proechimys canicollis** (*Allen*). — Ninety specimens, skins and skulls, and several additional skeletons and skulls, of which about one half are from Bonda and the rest from Santa Marta and nearby localities. (See this Bulletin, XII, 1899, p. 200.)

"*Proechimys mincæ* and *P. canicollis*. — The latter is the commonest rat below 1000 feet; the former takes its place in open lands, dry forests and thickets from about 1000 to about 2500 feet; but it does not extend far into the true mountain forest. Some *mincæ* are found nearly to sea-level, and *canicollis* occurs, rarely, to 2000 feet. Both live in holes in the ground, commonly in shady places and not far from streams. The proportion of tailless individuals is greater than Dr.

Allen has indicated, as we rejected a large proportion of them. I should say that one half of the adults taken had lost their tails, wholly or in part. In two or three cases we found the flesh and bones of the tail separated, so that it hung by the skin." — H. H. S.

32. **Isothrix rufodorsalis** *Allen.* — One specimen, adult male, Onaca. (See this Bulletin, XII, 1899, p. 197.)

33. Coendou sanctæmartæ, sp. nov.

Type, No. 15460, ♀ ad., Bonda, Santa Marta district, Colombia, April 28, 1899; coll. Herbert H. Smith.

Type: General color above dark brownish black, punctated with white. The quills for their basal fourth or third are white, then blackish or brownish black tipped with clear white, the length of the white tip varying according to the region of the body, averaging about 5 mm. over the greater part of the back and sides, but increasing in length on the top of the head, nape, shoulders, lower back, and basal half of the tail to about 10 mm., a few reaching 13 to 15 mm. Belly and limbs grayish brown, the pelage on these parts consisting of slender spines mixed with spiny hairs, the latter with fine hair-like tips. The pelage of the back consists almost wholly of spines, without any intermixture of hairs.

Two other specimens agree essentially with the type, except that in one the light tips of the spines of the anterior part of the back have the white replaced by pale chestnut; a fourth shows a similar variation in the color of the tips of the dorsal spines, and in addition has a slight intermixture of brownish woolly hairs among the spines over the posterior part of the back.

Represented by 5 specimens—four skins and skeletons and one additional skeleton—all taken in the immediate vicinity of Bonda, April 15 and 28, and June 10 and 14. Two are males and 3 are females, all adult. As shown by the following measurements, the males are considerably larger than the females.

External Measurements.

15459,	♂,	total length,	941;	tail,	433;	hind foot,	95.
23471,	♂,	"	"	941;	"	476;	"	"	—
15460,[1]	♀,	"	"	787;	"	433;	"	"	89.
23472,	♀,	"	"	737;	"	344;	"	"	89.
23473,	♀,	"	"	750;	"	—;	"	"	83.

[1] Type.

Cranial Measurements.

	15459 ♂	23471 ♂	15460[1] ♀	23473 ♀	23472 ♀
Total length	89	85	82	79.5	84
Basilar length	78	74	70	65	67
Zygomatic breadth	49	50	50	46	—
Nasals, length	30	30	29.5	25.5	30
" breadth anteriorly	21	20	19	18.5	19
" " posteriorly	23.5	21	21	21	19
Interorbital breadth	33	32	32	31.5	29
Depth of skull anteriorly	40.5	37	37	35	36
" " occiput	22	23	23	21.5	22
Diastema	23	22	20	19	20
Length of palate	39	39	35	32.5	35
" " upper toothrow	20	19.3	19	17.5	18

Coendou sanctæmartæ is a small form of the *C. prehensilis* ('*Synetheres*') group, but differs from *C. prehensilis*, *C. brandti*, and *C. centralis* in being about one third smaller than either of the three forms and very differently colored, the spines being much more narrowly tipped with white, the basal white portion narrower, and the dark portion much broader, so that the general coloration of the dorsal area is blackish punctated with white, instead of white varied with black, or black and white about equally mixed. The males are much larger than the females, but the largest male skulls are very much smaller than even the smallest skulls of the *C. prehensilis* group.

The series of 5 skulls of *C. sanctæmartæ* show great variation in the amount of inflation of the frontal region of the skull. In No. 15459 (♂) the front third of the nasals is nearly flat, but at the posterior border of the front third they rise abruptly to meet the greatly inflated frontals, this enormous inflation involving also the width of the posterior arm of the premaxillaries. In Nos. 23473 (♀), 23472 (♀), there is also considerable inflation of the frontal region, but in the other two skulls (including the type) there is very little, the nasals and frontals being nearly as flat as in the *Spiggurus* group. For this reason it seems impossible to differentiate satisfactorily forms in a group subject to such an extraordinary amount of individual variation in the form of the skull as is evident in the

[1] Type.

'*Synetheres*' group without having large series of specimens for examination.

"Tree-porcupines are found occasionally both in the dry forest and in the mountains, but I could learn little about their habits; they are certainly slow and clumsy animals, commonly seen only on the larger branches of high trees, seldom on the ground. At El Libano (5500 feet) one of these animals was shot, but the specimen was lost; it was, apparently, distinct from the kind collected near Bonda." — H. H. S.

34. **Dasyprocta colombiana** *Bangs.* — Thirty-five specimens, of which 23 are skins with skulls, 3 skins without skulls, 4 skulls without skins, and 5 skeletons. They include young of various ages, as well as adults. Less than one half were sexed by the collector, and only about one fourth have flesh measurements. All were taken at or in the immediate vicinity of Bonda.

Young, about one fourth grown, are darker and deeper colored throughout than the adults, and the long black hairs of the rump lack the whitish tips present in the adults.

As the species was described from immature specimens (*cf.* Bangs, Proc. Biol. Soc. Wash., XII, 1898, p. 163), the following measurements of adults will supplement the original description.

The flesh measurements of 8 adults are as follows:

15438, ♂,	total length,	521;	tail,	37;	hind foot,	127.
15436, ♂,	"	"	545;	"	—;	"	"	140.
14871, ♂,	"	"	533;	"	—;	"	"	—.
23454, ♂,	"	"	545;	"	—;	"	"	—.
15437, ♀,	"	"	535;	"	37;	"	"	140.
15444, ♀,	"	"	610;	"	22;	"	"	140.
15445, ♀,	"	"	648;	"	—;	"	"	133.
23455, ?,	"	"	660;	"	—;	"	"	140.

Four 'old adult' skulls measure as follows: Occipito-nasal length, 121.5 (120–124); basal length,[1] 97 (95–99); zygomatic breadth, 53 (51–55); mastoid breadth, 40.5 (40–41); interorbital breadth, 33.5 (32–34); breadth across postorbital processes, 43.7 (42–45); length of nasals, 48 (47–49).

[1] Mr. Bangs gives the basal length of "a ♀ young adult," as 169.4 — obviously a typographical error for 69.4.

This species greatly resembles *D. variegata* in coloration, but it is paler, very much larger, and differs markedly in cranial details.

"Agouti (called *iñeki*). — Common principally in the dry forest region, in woods or thickets; I do not think that it ranges far into the mountains. It makes deep burrows under roots and brush, and its habits and food are much like those of the paca." — H. H. S.

35. **Agouti paca** (*Linn.*). — Six specimens: 3 skins with skulls, and 3 additional skulls. Five are from Bonda, and the other from Baritaca.

" Paca (so called in Colombia). — Of all the South American rodents, this is the most esteemed for food; consequently it is much hunted and, being heavy and slow in its movements, is easily killed. It is also a favorite prey of the larger carnivora, and were it less prolific it would speedily become extinct. It is now rather rare near Santa Marta. Our specimens were shot in the dry-forest region, below 2000 feet, but it ranges into the mountain forest. Pacas make deep burrows, generally under roots of trees, and they eat herbage and various forest fruits." — H. H. S.

36. **Hydrochærus hydrochæris** (*Linn.*). — One specimen, immature, Mamatoca.

"Capivara (called by that name, but it was derived from Brazil; *capim-vara*, shortened to *capi-vara*, means a dweller in the grass in the Tupi language). — This is now a rare animal in the immediate vicinity of Santa Marta, though common further east and along the Magdalena flood-plain; our specimens were shot near Mamatoca, on the Manzanares River. They are never found far from the water and prefer places where there is tall grass, partly submerged. The diet seems to consist mainly or entirely of grass or certain small fruit. They are stupid animals and quite harmless. I was once knocked over by one which ran against me in the high grass near an Amazonian lake.

"Capivaras are very prolific, and a female is commonly seen with several young, all of different sizes; probably this has given rise to the idea that conception takes place during

gestation. It appears that only one young is born at a time, and probably the period of gestation is short. The flesh is considered unfit for food, owing to its strong musky odor; but this may be avoided by skinning and cleaning the animal immediately after death. I knew a planter who often gave his guests capivara meat for dinner, and they all liked it. It is white, tender, and good." — H. H. S.

37. **Sylvilagus superciliaris** *Allen.* — Twenty-four specimens, including young of various ages as well as adults, all from Bonda. (See this Bulletin, XII, 1899, p. 196.)

"Rabbit (called *conejo*). — Common in the dry-forest region, frequenting thickets and old clearings where the bushes and grass give it cover. They are nocturnal, being seldom seen during the day unless driven from their retreats; they eat tender young leaves, buds, twigs, and roots, and perhaps small fruits. I have never seen any rabbit burrows, and the hunters aver that they do not make any, but bring forth their young in sheltered places among the grass and bushes. Generally two or three young are found together. As far as I know, rabbits do not range into the mountain forest."—H. H. S.

38. **Felis concolor** *Linn.* — Not represented by specimens. Mr. Brown obtained a specimen at Santa Marta and another at Dibulla (Bangs, Proc. N. Engl. Zoöl. Club, I, 1900, p. 99).

"Puma (called *leon*). — Found occasionally below 3000 feet, principally in the dry forest; I never heard of it in the higher mountains, and it seems to be less common than the jaguar. We did not secure a single specimen of either; this was mainly ill-fortune, but it was partly due to the fact that no good dogs could be obtained, and it is almost useless to hunt large cats without them.

"South American hunters rather despise the puma; they consider it cowardly, and not to be compared with the jaguar for fierceness, agility, or strength; apparently it never attacks a full-grown man unless it has been brought to bay. Like the jaguar, it wanders at night and during the cool hours of the day, remaining quiet in the afternoon. It is said to make its den in rocky places, under a ledge; but I cannot attest this." — H. H. S.

39. **Felis onca** *Linn.* — Not represented in the collection A specimen was obtained at Dibulla by Mr. Brown (Bangs, Proc. N. Engl. Zoöl. Club, I, 1900, p. 99).

"JAGUAR (called *tigre*). — This animal is quite common, ranging from sea-level to 6000 feet at least; but possibly those found in the mountains are another form. All over tropical America the hunters recognize two kinds of jaguars; their testimony is unanimous and I am inclined to think they are right. It is noteworthy that this distinction was recognized by the aborigines, at least those of the Tupi-Guarany stock, and they had two names, *jaguára* and *jaguára pacoua-sororoca*, the latter meaning 'jaguar of the wild plantain,' because it frequents places where the plant grows. The jaguára is almost exclusively a highland form; the other is more common along the rivers, especially on the great flood-plains like those of the Orinoco, Amazon, and Paraguay; this kind takes to the water readily and may often be seen swimming across broad rivers, as I have noted more than once. This, also, is the kind that is said to catch fruit-eating fish, attracting them by rapping the water to imitate falling fruit, and then knocking them out with its paw; once, when I was canoeing at night on one of the Amazonian channels, a sound as of dropping fruit was heard, and the Indian crew said it was a jaguar fishing; a gentleman who was with me said that he had heard the sound before, and had no doubt that the Indians were right. I mention this because the story has been published by various travellers, and has been regarded as a 'yarn.' In fact, there is nothing impossible about it; the pacu fish will come to such sounds and the ruse is used in catching them.

"According to the hunters, the two kinds of jaguar are of about the same size, but the highland form is rather more slender, with longer legs; they aver that it can be readily recognized by its cry. They say also that it is difficult or impossible to distinguish the skins of young animals, but that in the adults, the *pacoua-sororoca* has larger spots, distinctly arranged in 'roses'; in the jaguára the spots are smaller and more evenly distributed. The Santa Marta hunters speak of the two kinds, but have no distinctive names. The black

jaguar is not found at Santa Marta, and from all I have heard it seems to be almost confined to the great river plains. The hunters scout the idea that this is a variety of the jaguar; they say it is commonly larger and always fiercer, and that it has a peculiar cry; that black females always go with dark cubs and spotted ones with spotted cubs. I am more inclined to doubt this than the other report; the mere difference of appearance would lead the hunters to regard the black jaguar as distinct. Some skins which I have seen on the Paraguay were dark without being actually black, and they showed the spots plainly. If the black jaguar is a melanic variety it is of the *pacoua-sororoca*. I give these reports because they seem interesting, and hunters are generally good authorities on such questions. I may note in passing that the same men recognize only two kinds of coati (one kind in southern Brazil), though naturalists have described a great number; and they do not divide other variable species, such as the tamandua.

"Jaguars are much fiercer than pumas, and I know of several instances where they have attacked man unprovoked, even springing on him from behind, and in broad daylight. They are readily brought to bay by dogs, and fight them fiercely, often killing several before the hunters come up. The spear-hunters of the Paraguay, after bringing the jaguar to bay, provoke them to spring on the spear, which is held diagonally with the butt resting on the ground. Jaguars fight almost entirely with their paws, the claws sheathed, so that the weapon is, in effect, like a padded club. The force of their blows is very great. A large dog, belonging to one of my Brazilian hunters, was hurled twenty feet and was literally crushed against a tree trunk. I once found a deer which had just been killed by a jaguar and was still warm; it was only on close examination that I found a small scratch on the shoulder; not a bone was broken, and there was little suffusion of blood. The animal had been knocked dead with a paw like velvet.

"These animals are a great pest about cattle estates, killing calves or even old cows or bulls, and often pigs; they drag their

prey to the nearest forest to feast on it at their leisure. I never heard of them throwing a dead animal on their shoulders as tigers are said to do, and I fancy none of the cats could perform that feat. But the strength of the jaguar is sufficiently shown by its dragging large animals. In Brazil, my wife and I once followed a track on which a cow had been dragged; it was fully half a mile long, at first over open land and then in tangled forest. The carcass was found untouched, and our hunters subsequently shot the jaguar, which was hidden near by; it was not an unusually large one. . . .

"It is commonly said that jaguars will not attack a sleeping man, but will wait until he moves. A Brazilian engineer of my acquaintance, while waiting for a messenger, went to sleep in the forest; the messenger, on his return, found a jaguar 'smelling' of the sleeper, as he reported; the animal made off, but its tracks corroborated the story. I myself have found large jaguar tracks close to the hammock in which I had slept, a little away from the camp circle.

"Like most cats, they seem to fear a light at night, perhaps because they do not understand it. On one occasion while mothing in the mountain forest near Santa Marta, I carried a lantern about to examine my sugar baits; next morning we found jaguar tracks following mine for half a mile. At this place jaguars were frequently heard moving through the shrubbery, quite near our camp; and a month after we had left it, a visit to the place showed that a jaguar had occupied the improvised bed which my wife and I had slept in.

"This and other cats, as well as wild and tame dogs, are very fond of mangoes; and during the mango season they come around the settlements to eat the fruit. They often pass over several miles of country in their hunting excursions; in fact, it is doubtful if they have settled homes except during the breeding season. On one occasion our hunters tracked a jaguar for fully ten miles, on a high mountain.

"The male remains with the female while the cubs are young, and this, I believe, is the rule with all American cats; but he makes long hunting excursions while his mate remains near her cubs. Jaguars live principally on deer, pacas,

agoutis, and cattle or pigs when they can get them; more rarely they attack wild hogs or tapirs. It is certain that the *pacoua-sororoca* is an experienced fisherman, whether or not he catches fish as reported; it is also said to attack alligators and turtles, turning the turtle over and scooping it out of its shell; but I cannot attest this. Jaguars also eat several wild fruits, such as the 'hog-plum' (*Spondias*).

"The jaguar does not climb trees, at least habitually. It often 'sharpens its claws' on a tree trunk, as cats do on a chair leg; particular trees are used over and over again for this purpose." — H. H. S.

40. **Felis sanctæmartæ** *Allen.* — Two specimens, Bonda, as already recorded (this Bulletin, XX, 1904, p. 332, Oct. 8, 1904).

"Ocelot (called *tigrillo*). — Moderately common. It is found near the coast, but I do not know its mountain range, though specimens were shot at about 3500 feet; our hunters said they saw it in the Libano Mountain at nearly 6000 feet. Unlike the jaguar, it climbs trees readily, though seen quite as often on the ground. It commonly preys on large game birds as well as rabbits and other rodents, and it is a great poultry thief. Ocelots are not at all feared, and even small boys will attack them with stones. Like jaguars they are fond of mangoes and certain forest fruits. The den is said to be made in a hollow tree." — H. H. S. [Evidently Mr. Smith has not distinguished between the two — large and small — spotted cats found at Santa Marta.]

41. **Felis** sp. incog. — One specimen, adult male, and an additional skull, Bonda, March 30. This species appears to belong to the *Felis pardinoides* group, as recognized by Thomas (Ann. and Mag. Nat. Hist., (7) Aug., 1903, p. 236), but lack of material for comparison prevents a satisfactory determination. Collector's measurements: Total length, 927; tail vertebræ, 396. The skulls measure 95 x 63 and 94 x 63.

42. **Felis yagouarondi** *Desmarest.* — One specimen, adult (sex not determinable), near Bonda, March 1. The only flesh measurement available is, total length, 1018. The skull measures 109 x 66. I refer also to this species a kitten in

first pelage; it is nearly uniform black, with the tips of the hairs subapically ringed narrowly with gray.

43. **Felis eyra** *Desmarest.* — One specimen, adult female, Masinga, March 14. Collector's measurements, total length, 916; tail vertebræ, 432. Skull, 95 x 60.

"GATO PARDO. — This brown, slender cat is quite common near Bonda and along the coast, and ranges upward to at least 4000 feet. It seems to be mainly terrestrial. The only living one I have seen was standing on a rock, and it fled when my companion, a boy, threw a stone at it." — H. H. S.

44. Canis (Thous) aquilus (*Bangs*).

Urocyon aquilus BANGS, Proc. Biol. Soc. Wash., XII, 93. April 30, 1898. Santa Marta Mountains, Columbia.

Fifteen specimens (skins and skulls) not sexed, but evidently representing adults of both sexes and young adults, and 6 additional skeletons, all taken in the vicinity of Bonda, in December, January, February, May, August, September, November, and March. Only a part have external measurements. The series varies little in respect to coloration. Measurements of 7 adults, taken by the collector before skinning, are as follows:[1]

14851, ♂,	total length,	978;	tail vertebræ,	286.						
14627, ♂ ?,	"	"	965;	"	"	263.				
14853, ♂,	"	"	959;	"	"	349.				
14623, ♀ ?,	"	"	927;	"	"	260.				
14626, ♀ ?,	"	"	914;	"	"	274.				
23503, ?,	"	"	927;	"	"	248;	hind foot,	133.		
23504, ?,	"	"	940;	"	"	324;	"	"	146.	

Eight adult skulls measure as follows:[1]

14627, old	♂ ?,	total length,	139;	basal length,	131.5;	zyg. breadth,	80.					
14853, ad.	♂,	"	"	137;	"	"	129;	"	"	73.5.		
14637, yg. ad.	♂ ?,	"	"	134;	"	"	128.5;	"	"	69.		
14625, old	♂ ?,	"	"	134;	"	"	127;	"	"	75.		
14635, ad.	♀ ?,	"	"	134;	"	"	126;	"	"	71.		
14623, ad.	♀ ?,	"	"	132;	"	"	126.5;	"	"	69.5.		
14626, ad.	♀ ?,	"	"	130;	"	"	124;	"	"	68.		
14624, old	♀,	"	"	128;	"	"	123;	"	"	73.		

[1] The question mark after the designation for sex in both the above tables indicates that the determination is presumptive; in the other cases the sex is positively determinable by the skins.

Canis aquilus is scarcely distinguishable externally from Venezuela specimens of *C. cancrivorus* (see *antea*, p. 343). The skull, however, is shorter and broader, with relatively heavier dentition; the facial portion of the skull is very much broader than in *C. cancrivorus*. In this species, as in other numbers of the American Canidæ, except *Urocyon*, the position of the temporal ridges varies with the age of the animal; in young adults they are slightly developed, and run about midway down the parietal convexity of the skull, as in other species of *Canis;* with increase of age they become stronger and move inward, in very old specimens uniting, as usual, at least posteriorly, to form a more or less distinct sagittal crest, — an entirely different position and mode of development from the supraorbital ridges in *Urocyon*.

Two specimens received recently from Merida, Venezuela, appear also to be distinctly referable to *C. aquilus*.

"Wild Dog (called *soro*, but this name is used for various other small carnivora, sometimes *soro perro*, dog-soro). — Moderately common below 3000 feet, and may range above that; but it seems to belong properly in the dry-forest region. It is exclusively terrestrial, at most walking on logs or rocks, like a dog; it preys on small rodents, lizards, etc., and perhaps crustacea, and eats many fruits. I could learn little of its habits, but apparently it makes its home in natural crevices of the rocks or in hollow trees. The animal has a strong and sickening odor, so that skinning it is a most unpleasant job. It is very uncleanly; the pelage is commonly so soiled and matted that it can only be cleaned with great difficulty. The wild dog is diurnal, but also wanders at night, at least when it is not very dark." — H. H. S.

45. **Conepatus mapurito** (*Gmelin*). — Two specimens, Bonda and Playa Brava, January and September.

"Skunk. — Common in the dry forest, and found occasionally in the mountains to 4500 feet or higher. They live in natural crevices, stumps, etc., and appear to prey on small mammalia, birds and lizards; but the hunters avoid them and really know little about their habits." — H. H. S.

46. **Lutra colombiana,** sp. nov.

Type, No. 15479, ♀ ad., Bonda, Santa Marta district, Colombia, August 18, 1899; coll. Herbert H. Smith.

Color above pale reddish brown (between Prout's brown and hair brown of Ridgway); below pale grayish brown, the hairs and fur very pale brown basally, the hairs with long yellowish white or soiled white tips. Nose pad with the upper border double-concave, the lower border straight; transverse width, 15 mm., vertical width, 10.

Total length (type), 979; head and body, 547; tail vertebræ, 432; hind foot, 96. Two other adults are slightly smaller, the three specimens measuring: Total length, 966 (934–997); head and body, 555 (547–565); tail vertebræ, 411 (387–432). Skull (type), basal length, 101; zygomatic breadth, 67. (For detailed measurements see table below.)

Represented by 4 specimens: 1 skin and skull, 2 skins with skeletons, and 1 skeleton, all from Bonda, taken in February, August, and November. All are adult; two are sexed as females, while the sex of the others is not indicated. They differ little in color, but in the November specimen the pelage is longer, softer, and thicker than in the others.

CRANIAL MEASUREMENTS OF OTTERS.

	Lutra colombiana.[1]				*L. insularis.*[2]	*L. annectens.*[3]
	15479 ♀	23507	23494 ♀	14633	4765	6678
Occipito-nasal length..	107	103	98	103.5	107	118
Basal length.....	101	98	94	92.6	104.5	112
Zygomatic breadth....	67	—	66	64	70.5	83
Interorbital breadth...	22	22.3	21.6	19	22	25.5
Postorbital breadth....	15	15	16.3	18.5	18.5	18
Mastoid breadth.....	64.6	64	61	—	67.5	76
Length of palatal floor.	43.5	43	41	42	45	48
Inner base of incisors to end of pterygoid proc	57	56	54.5	57	60.5	64
Postpalatal length.....	49	46	46	50	50	56.5
Upper premolar - molar series.....	30	28.5	29.5	30	30	31
Lower premolar-molar series.....	34	32	31.5	34	34	36
Pm^4, length on outer border.....	12.3	12	11.3	12.4	12	12.3
Pm^4, width at middle..	10	9.7	9	10	9.5	10.2
" oblique diameter[4]	13.5	13	13	14	13	13

[1] All from Bonda (Santa Marta), Colombia; coll. H. H. Smith.
[2] Princestown, Trinidad; coll. Frank M. Chapman.
[3] Laguna de Juanacatlan, Jalisco, Mexico; coll. Dr. A. C. Buller.
[4] Diagonally from the antero-internal point of lobe to postero-outer angle of tooth.

This species agrees with other South American otters in the general form of the braincase, which is low, flat, and much expanded, in comparison with the *Lutra canadensis* group of North America, in which the braincase is much narrower, deeper, and less expanded. The audital bullæ are very small and flat, the teeth large for the size of the skull and greatly crowded in the tooth line. It differs from *L. annectens* Forsyth-Major (from Jalisco, Mexico), which also belongs to the South American group, in its much smaller size and relatively much larger teeth, particularly pm^3 and pm^4. A specimen of the latter from Laguna de Juanacatlan, Jalisco, Mexico (practically a topotype), has a basal length of 112, a zygomatic breadth of 83, and a mastoid breadth of 76, while the largest specimen of a series of four from Bonda has the corresponding measurements, respectively, 101, 67, and 64.6.

It is rather smaller even than *L. insularis* F. Cuvier, from Trinidad, which has the braincase higher and more convex, the audital bullæ about one fourth larger, and the dentition much weaker — nearly one third less massive — and the form of pm^4 is strikingly different, the postero-internal basal portion in *insularis* being very narrow, instead of very broad as in *L. colombiana*. In short, *L. insularis* is a very strongly differentiated insular type, sharply set off from the other South American otters by strongly marked dental and cranial characters.

Unfortunately, no specimens of *L. enudris* (commonly emended to *enhydris*) F. Cuvier, described from Guiana, are available for examination. According to Forsyth-Major (Zool. Anz., XX, 1897, p. 141; Ann. and Mag. Nat. Hist. (6), XIX, 1897, p. 618), the audital bullæ are less flattened than in *L. canadensis*, but in *L. colombiana* they are very much more flattened than in *L. canadensis*, in this respect agreeing with *L. insularis*. In view of the several strongly marked local forms now so well known in the *L. canadensis* group, and the striking cranial differences that distinguish the Santa Marta animal from its nearest known geographical allies — the Mexican *L. annectens* on the one hand and the Trinidad *L. insularis* on the other, — and in view of the general fact

that all the well-known forms of Santa Marta mammals, and especially the Carnivora, differ markedly from their allies from Venezuela, Guiana, and Brazil, it seems pretty evident that the Santa Marta otter forms no exception to the rule. Furthermore, the advance of our knowledge of otters in general during the last fifteen years, and particularly those of North America, renders it even more probable now than in 1889, when Mr. Oldfield Thomas wrote an excellent paper on otters in general (Proc. Zoöl. Soc. London, 1889, pp. 190–200), that his suggestion (*l. c.*, p. 199) that there may be "one, two, three, or four Neotropical species in addition to those already mentioned [*Lutra brasiliensis* and *L. felina*]," is a foresight that will be verified by the recognition of not less than four additional species or subspecies as soon as the material for their satisfactory investigation becomes available; for all of which there are probably available names, heretofore generally treated as synonyms of a supposed single wide-ranging species.

"Otter (called *Lutra*). — Found occasionally along the larger streams, living generally in pairs or families, in holes or burrows along the forest-lined banks. It never goes far from the water, and lives on fish. Otters are easily tamed and make most amusing and affectionate pets; they become attached to particular persons, following them about like dogs and often uttering their peculiar plaintive cry. I have seen a tame otter swimming with the village boys and evidently enjoying the sport. I am told that they can be taught to fish for their masters, but have never seen this." — H. H. S.

47. **Tayra barbara irara** *Allen.* — Fourteen specimens, skins and skulls, and several additional skeletons, all collected at or near Bonda. (See this Bulletin, XX, 1904, p. 36.)

Since my former note on this species several additional specimens have been found in a lot of duplicates not at that time examined. In two the white spot on the withers is present and in two it is lacking. I notice also that Mr. Bangs (Proc. New Engl. Zoöl. Club, I, p. 100) has reported the white shoulder spot present in three out of his five specimens. It is thus present in 16 out of 20 known specimens.

"GALICTIS (called *soro-huache*). — Moderately common below 3000 feet. It is arboreal, but frequently seen on the ground; its habits seem to be much like those of the kinkajou. The hunters distinguish two kinds, differing especially in the length of the tail; whether the difference is due to age or is varietal or specific I cannot venture to decide. Both forms vary greatly in color and markings." — H. H. S.

48. **Potos flavus megalotus** (*Martin*). — Eleven specimens (5 males and 6 females, all adult), collected near Bonda, March 24–June 17, and one in July and one in August. (On the name *megalotus* see this Bulletin, XX, 1904, pp. 72–74.)

These specimens have the dorsal surface bright rusty yellow, the extreme tips of the hairs reddish brown, not black or blackish as in the allied forms; the dark dorsal streak, which is dark reddish brown, is well defined in three of the specimens, irregular and imperfect in two, and quite obsolete in the remaining two; in several of the brighter specimens the general color above is bright reddish fulvous or 'foxy red,' in others much paler; ventral surface clear pale yellow, varying to golden, especially along the middle of the abdomen; top of the head darker than the back; back of the ears not darker than adjoining pelage; a more or less dusky eyering; upper surface of tail like the back, darkening somewhat towards the tip, the lower surface dull pale yellow.

One specimen (No. 14855, ♂ ad.) is strikingly different from the rest, the general coloration, especially of the upper parts, being much paler as regards the fulvous tints, with the hairs tipped with brownish black or dusky, and so extensively as to give a blackish cast to the central part of the dorsal area, from the head to the end of the tail, the well-defined dorsal stripe being continued to the end of the tail. In general effect it is widely different from any other specimen of the series, much more resembling *Potos flavus caucensis* from the upper Cauca Valley in southwestern Colombia.

The collector's measurements are as follows:

♂,	total length,	1029;	tail vertebræ,	521;	hind foot,	114.
♂,	" "	1026;	" "	508;	" "	—
♂,	" "	1003;	" "	489;	" "	—
♂,	" "	978;	" "	457;	" "	108.
♀,	" "	953;	" "	495;	" "	108.
♀,	" "	965;	" "	470;	" "	114.
♀,	" "	915;	" "	493;	" "	102.
♀,	" "	914;	" "	464;	" "	93.
♀,	" "	914;	" "	470;	" "	102.
♀,	" "	895;	" "	502;	" "	102.

In these specimens the posterior fourth of the palatal floor is abruptly and deeply depressed (from m^2 posteriorly); the teeth are of medium size, and the audital bullæ are well developed and considerably inflated. Two average middle-aged skulls, male and female, measure as follows: Total length, ♂ 89, ♀ 87; basal length (inner base of incisors to posterior border of condyles), ♂ 82, ♀ 79; zygomatic breadth, ♂ 57.3, ♀ 56.5; interorbital breadth, ♂ 19, ♀ 19; width of braincase, ♂ 36.5, ♀ 35; length of palate, ♂ 39, ♀ 36; upper premolar-molar series, ♂ 21, ♀ 19; lower premolar-molar series, ♂ 22, ♀ 20.6; length of lower jaw, ♂ 61, ♀ 59; height at condyle, ♂ 28, ♀ 29; height at coronoid, ♂ 40, ♀ 40.6.

"KINKAJOU (called *martico*). — Moderately common in forest below 3000 feet, and perhaps above that altitude; but most of our specimens were shot in the dry forest not far from sea-level. It goes singly or in pairs, is arboreal, seldom seen on the ground, and seems to be diurnal rather than nocturnal. It moves among the trees cautiously, choosing the larger branches, and does not make long leaps. It is said to live in hollows in the upper part of tree trunks; beyond that I learned nothing of its habits." — H. H. S.

49. **Procyon proteus** *Allen.* — Six specimens (2 males and 4 females, all adult), skins and skulls, Bonda. (See this Bulletin, XX, 1904, p. 333.)

"RACCOON. — Common in dry forest near the coast, and along the larger streams for a few miles inland; I do not think that it is found among the mountains [taken at 8000 feet by Mr. Brown]. It is mainly nocturnal in its habits, and is frequently hunted (for its skin) on the sand beaches during moon-lit nights. Its food consists largely of marine and fresh-water animals, fish, mollusca, and crustacea, and it also eats certain fruits.

"The *Coati* is not found near Santa Marta." — H. H. S.

50. **Myotis nigricans** (*Wied*). — Thirty specimens, Bonda (*l. c.*, p. 94 [1]).

51. **Lasiurus pallescens** (*Peters*). — One specimen, Bonda (*l. c.*, p. 94).

[1] A list of the Bats in the present collection was published in this Bulletin, Vol. XII, 1900, pp. 87–94. A few species received later are here included. The reference, "*l. c.*" refers to that paper.

52. **Saccopteryx leptura** (*Schreber*). — Seven specimens, Bonda (*l. c.*, p. 94).

53. **Saccopteryx bilineata** (*Temm.*). — Thirty-six specimens, Bonda and Minca (*l. c.*, p. 93).

54. **Peropteryx canina** (*Wied*). — Eight specimens, Bonda (*l. c.*, p. 94).

55. **Molossus bondæ** *Allen*. — One specimen, Bonda (*antea*, p. 228).

56. **Promops affinis** *Allen*. — Six specimens, vicinity of Bonda (*l. c.*, p. 91).

57. **Promops glaucinus** (*Wagner*). — Four specimens, Santa Marta, collected and presented by Mr. Francis C. Nicholas. (Not represented in the Smith collection.)

58. **Thyroptera tricolor** *Spix*. — One specimen, Cacagualito (*l. c.*, p. 94).

59. **Chilonycteris rubiginosa** *Wagner*. — One specimen, Cacagualito.

60. **Dolichophyllum macrophyllum** (*Wied*). — One specimen, Bonda (*l. c.*, p. 91).

61. **Chrotopterus auritus** *Peters*. — One specimen, Bonda (*l. c.*, p. 91).

62. **Micronycteris hypoleuca** *Allen*. — One specimen, Bonda (*l. c.*, p. 90).

63. **Micronycteris megalotis** (*Gray*). — Nineteen specimens (*l. c.*, p. 90).

64. **Trachops cirrhosus** (*Spix*). — One specimen (*l. c.*, p. 90).

65. **Phyllostomus hastatus** (*Pallas*). — One specimen, Bonda (*l. c.*, p. 90).

66. **Hemiderma perspicillata** (*Linn.*). — Twenty-three specimens, Bonda (*Hemiderma brevicauda, l. c.*, p. 90) and Cacagualito.

67. **Glossophaga longirostris** *Miller*. — Thirty-four specimens, Bonda and vicinity (*l. c.*, p. 89).

68. **Glossophaga soricina** (*Pallas*). — Six specimens, Bonda.

69. **Artibeus palmarum** *Allen and Chapman*. — Four specimens, Bonda (*l. c.*, p. 89).

70. **Artibeus planirostris** (*Spix*). — One specimen, Mamatoca.

71. **Uroderma bilobatum** *Peters.* — Twenty specimens, Bonda, Cacagualito, and Minca (*l. c.*, p. 89).

72. **Vampyrops vittatus** (*Peters*). — Two specimens (*l. c.*, p. 88).

73. **Chiroderma jesupi** *Allen.* — One specimen, Cacagualito (*l. c.*, p. 88).

74. **Desmodus rufus** *Wied.* — Sixteen specimens, Bonda (*l. c.*, p. 87).

75. **Diphylla ecaudata** *Spix.* — One specimen, Cacagualito (*l. c.*, p. 87).

"Bats. — In general I can give no information beyond what appears on the labels. Blood-sucking bats of at least one species [two, *Desmodus rufus* and *Diphylla ecaudata*] are common along the coast, especially near the rivers Buritaca and Don Diego; they have literally depopulated several cattle estates, and many horses, mules, and even pigs are killed by their continued work. The planters say that these bats come down from the mountains, are numerous for a few months or a year or two, and then disappear. It is certain that they appear and disappear as stated, but it is more likely that they migrate along the coast. At Don Diego we were told that these bats slept during the day about the bases of the leaf-stalks of cocoa-nut palms. We saw bats of some kind there; but before any were captured our whole party was incapacitated by fevers, and we were obliged to leave." — H. H. S.

In addition to the 26 species of bats enumerated above, two others have been recorded by Mr. Bangs, namely *Vampyrops lineatus* (E. Geoffroy) and *Dermanura quadrivittata* (Wagner), both from the Sierra Nevada de Santa Marta at from 5000 to 8000 feet altitude.

76. **Alouatta seniculus rubicunda,** subsp. nov.

Type, No. 14655, ♂ ad., Bonda, Santa Marta district, Colombia, Dec. 22, 1898; coll. H. H. Smith.

Head, neck, limbs, tail, and ventral surface dark reddish chestnut (in fresh pelage often with a blackish tone); dorsal region dark

reddish orange (in fresh pelage often deep, dark red, fading into orange in worn pelage). Facial naked parts brownish black; "scrotum snow-white, a singular and striking sexual mark" (H. H. Smith).

Total length, 1346; head and body, 597; tail vertebræ, 749. Seven adult males average, total length, 1290; tail vertebræ, 703. Skull (type), total length, 118; zygomatic breadth,—(skull broken). Nine old male skulls average, total length, 121; zygomatic breadth, 104. (For further measurements see tables below.)

Represented by 84 specimens, of which 50 are skins with skulls or skeletons, 12 are skulls without skins, and 22 are skeletons without skins. All were taken at or near Bonda, and each month of the year is represented, though very few were taken in November and June, while February, March, May, July, and August are each represented by 10 or more specimens. Both sexes and young of various ages are included. Unfortunately only a few of the specimens were sexed and measured by the collector.

This large series shows a wide range of variation in color, which proves to be entirely independent of sex or age, and largely independent of season. The head, shoulders, flanks, limbs, and tail vary from light reddish chestnut to dusky purplish chestnut, and the dorsal area from golden yellow to brilliant reddish or even clear dark red. In several of the specimens the beard and front of the head are blackish. The apical third or more of the tail is often lighter than the limbs or basal portion, the terminal third not infrequently fading out to the color of the back, this condition agreeing with the *Mycetes chrysurus* of I. Geoffroy.

The hairs individually are also variable in texture and color, the pelage being long, soft, silky and shining in the new, freshly acquired coat, and shorter, harsher, less shining and paler-colored in the worn coat. The darkest and richest-colored specimens are in fresh pelage, which, as shown by the dates of collecting, is acquired at different seasons by different individuals. In the paler, worn specimens the individual hairs are sometimes nearly concolor from tip to base; in the fresh, unworn pelage they are generally tricolor, the basal and apical thirds being much darker than the middle portion. The hairs of the dorsal region, in fresh pelage, are dusky at base, then orange, with long, dark, bright reddish tips, which later disappear to a greater or less extent by fading and wear, the basal third or fourth still retaining for a time its dark brown tint, this feature, however, varying greatly in different individuals. In fresh coat the head, neck, limbs, and tail are very dark reddish chestnut, with a decided tinge of blackish; on the head, neck, and shoulders the hairs individually have the basal third or fourth blackish brown, the middle third dark red, and the subapical fourth nearly black, and the extreme tips dark red, giving a dusky effect to the general coloration of these parts.

A. seniculus rubiginosa differs from true *A. seniculus* of Guiana in its much darker, richer coloration, and larger size. In the absence of skulls of true *seniculus* it is impossible to say whether or not they are also distinguished by cranial characters, which seems probable in view of the sharp differentiation in this respect of the red howler of the Cauca Valley from that of the Santa Marta district. That the group is sub-

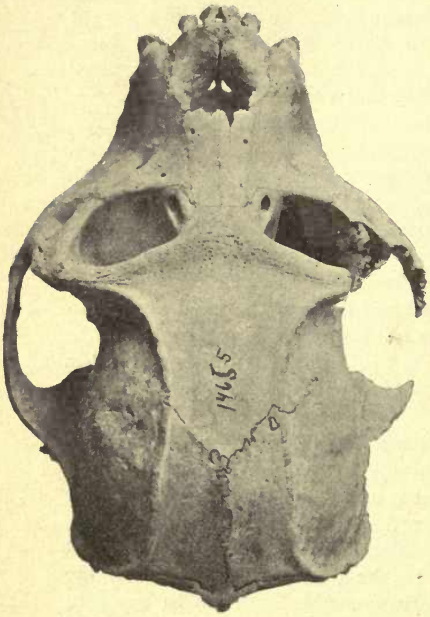


Fig. 1. *Alouatta seniculus rubiginosa.* Type. $\frac{2}{3}$ nat. size.

Fig. 2. *Alouatta seniculus caucensis.* Type. $\frac{2}{3}$ nat. size.

ject to great local variation is abundantly shown by a fine series of 9 specimens from the upper Cauca Valley, collected at altitudes of from 3000 to 6000 feet in May and June, 1898, by Mr. J. H. Batty. These agree in pattern of coloration with the Santa Marta series, but differ widely in color, being many shades paler throughout, including the head, neck, flanks, limbs, and tail, as well as the dorsal area, which latter is deep straw yellow instead of reddish orange, while the

darker parts are proportionately lighter than in the Santa Marta series.

In the absence of extensive series from numerous localities, it would be presumptive to attempt to allocate the many names that have been bestowed by different authors upon the *seniculus* group of howlers. It is evident, however, that some of them have been based wholly on features subject to

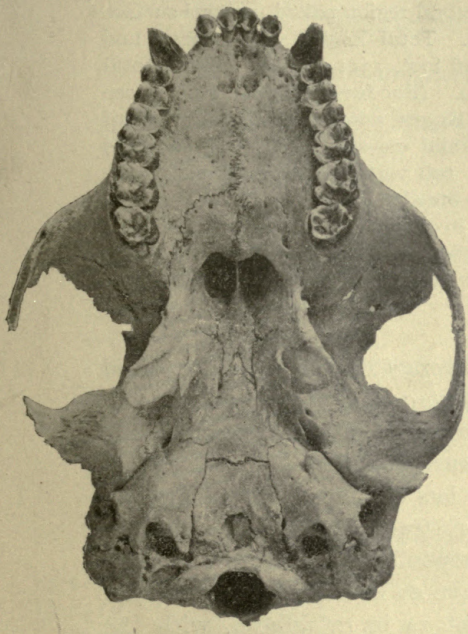


Fig. 3. *Alouatta seniculus rubiginosa.* Type. $\frac{2}{3}$ nat. size.

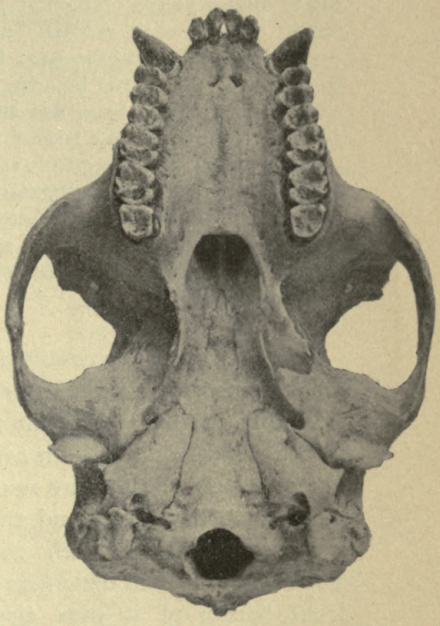


Fig. 4. *Alouatta seniculus caucensis.* Type. $\frac{2}{3}$ nat. size.

a wide range of individual or seasonal variation. As shown by the present large Santa Marta series, there is little if any sexual variation in color, contrary to the belief of many of the early writers.

The Cauca series is strikingly different from the Santa Marta series, not only in color and size, but in cranial characters, as shown below. As none of the names given to this group of howlers apply well to either the Cauca or the Santa

Marta forms, either geographically or otherwise, the Cauca subspecies may be provisionally distinguished as follows:

Alouatta seniculus caucensis, subsp. nov.

Type, No. 14162, ♂ ad., Charingo (alt. 3000 ft.), upper Cauca Valley, Colombia, May 5, 1898; coll. J. H. Batty.

Head, neck, limbs and tail dark reddish chestnut, the latter much paler apically than at the base; back and sides golden yellow, deepening to orange yellow on flanks; pectoral region naked, ventral surface thinly clothed with reddish hairs. Total length, 1234; head and body, 603; tail vertebræ, 640; hind foot, 135; ear, 35. Skull, total length, 116; zygomatic breadth, 80. (For further measurements see table below.) The type has the largest external measurements of the series, but not the largest cranial measurements. Three adult males average, total length, 1155; tail vertebræ, 600; skulls of the same, total length, 119; zygomatic breadth, 77.5.

There is considerable variation in color, the brightest specimens closely approaching the faded specimens of the Santa Marta series. The two series, as a whole, however, differ strikingly in coloration, as indicated above.

Alouatta seniculus caucensis averages much less in external measurements than *A. s. rubiginosa*, and it has also a considerably smaller skull, but the most marked differences are in the cranial details. In *caucensis* the skull is narrower and flatter, the zygomata are much less expanded, the palatal region much narrower, and the rostral portion of the skull is much compressed, with correspondingly narrower nasals. Thus the nasals in *caucensis* have an average breadth at the front border of 10 mm. against 14 in *rubiginosa*, with the necessarily correlated difference in contour of the nasal region this implies, the least interorbital breadth being 2.5 mm. less in *caucensis*. In *rubiginosa* the upper toothrows in old males are often curved slightly outward and the palatal area is very broad; in *caucensis* the upper toothrows are straight and parallel, and the palatal area is much narrower, the distance between m^1 in the two forms being, respectively, 24.6 (10 males) and 21.8 (5 males). (See figs. 3 and 4.)

The following tables of measurements show the difference in size in the two forms and in cranial proportions. (The

letters y., m., and o. indicate, respectively, young-adult, middle-aged, and old.) The females average smaller than the males, but some of the old males in the Santa Marta series are smaller than some of the females. That this exceptional condition is real and not due to mistakes on the part of the collector in sexing is shown by the skins, in which the sex is unmistakably evident.

External Measurements.

A. Alouatta seniculus rubicunda.

23373	♂	Total length,	1308;	head and body,	622;	tail vertebræ,	686.
23371	♂	"	"	1308;	"	"	"	——;	"	"	——.
23374	♂	"	"	1219;	"	"	"	571;	"	"	648.
23376	♂	"	"	1308;	"	"	"	590;	"	"	718.
23385	♂	"	"	1133;	"	"	"	415;	"	"	718.
25754	♂	"	"	1410;	"	"	"	——;	"	"	——.
14655	♂	"	"	1346;	"	"	"	597;	"	"	749.
14653	♀	"	"	1270;	"	"	"	559;	"	"	711.
14654	♀	"	"	1245;	"	"	"	534;	"	"	711.
14656	♀	"	"	1219;	"	"	"	559;	"	"	660.
23377	♀	"	"	1320;	"	"	"	571;	"	"	749.
23757	♀	"	"	1270;	"	"	"	540;	"	"	730.
23360	♀	"	"	1270;	"	"	"	——;	"	"	——.
23361	♀	"	"	1295;	"	"	"	——;	"	"	——.

B. Alouatta seniculus caucensis.

14162	♂	Total length,	1243;	h. and b.	603;	t. vert.	640;	h. foot,	135;	ear,	35.
14163	♂	"	"	1185;	"	"	"	574;	"	"	611;	"	"	135;	"	33.
14168	♂	"	"	1045;	"	"	"	495;	"	"	550;	"	"	130;	"	32.
14170	♀	"	"	1014;	"	"	"	483;	"	"	531;	"	"	125;	"	30.
14167	♀	"	"	1050;	"	"	"	494;	"	"	556;	"	"	126;	"	32.

Cranial Measurements.

Alouatta seniculus rubiginosa.

	14655 ♂ o.	14651 ♂ o.	14647 ♂ m.	23380 ♂ o.	23364 ♂ o.	23370 ♂ o.	23354 ? o.	23369 ♂ o.	23379 ♂ o.	23372 ♀ o.	23355 ♀ o.	23358 ♀ o.	23338 ♀ o.	14649 ♀ o.	14654 ♀ o.	14660 ? o.	14653 ♀ o.	Average. 8 males	Average. 8 females.
Total length	118	117	122	122	118	117	116	125	127	121	111	99.5	105	103	116.5	114	107	121	109.6
Basal length (Hensel)	104	98	100.5	106	101	97	98	111.5	113	103	93	84	85	86	87	93	85	104	89.5
Zygomatic breadth	—	79	76	82	78	79	79	84.5	84	79	72	69	72	70	—	79	68.5	80.3	72.7
Postorbital breadth	46.5	46.5	44	45	38	39	41.5	38	42	40	44.5	44	46	37	44	45	46	42.5	43.2
Interorbital breadth	15.5	14	14	15	12	15	15	16	17.5	17	15	14	14	14.5	13	13	14	14.8	14.3
Orbital breadth	74	66	67	69	66	69	69	74	74	74	64	62	62	60	60	65	60	70	63.3
Mastoid breadth	58.5	59.5	61	61	58	59	62	61	63	56	55	52.5	51	53	58	57.5	56	60	54.8
Palatal breadth at m^1	27	24	25.5	23	24	22	23	26	26	25	21	21	21	21	22	23	21	24.6	21.9
Rostral breadth	32	30.5	30.5	33.5	33	28	33	35	34.5	34	27	26	25.5	25	27.5	29	26	32	27.5
Palatal length	46.5	40	43	45.5	42	43	42	49	46	45	39	36	37	34	38.5	39.5	38	44.3	38.4
Postpalatal length	59	57	58.5	61.5	60	54	56.5	64	63	57	54	49	48	52	46.5	54	46.5	59.6	51
Front width of nasals	14	13	14	—	13	13.5	18	16	18	—	—	11	13	11.5	12	11	12	14.5	11.7
Upper prem.-molar series	36.5	34.5	38	36.5	36	35	37	36.5	35.3	35	32.5	34	33	32	34.6	35.5	37	36	34.2
Lower prem.-molar series	40	39	43.5	39.5	39	37.5	40	41	40	39	37	37	35	36	38	40	40	40	37.7
Length of lower jaw	101	99	98	100	96	95	92	106	104	100	88	81	83	81	84	90	82	100	86
Height of lower jaw	72	69	72	70	71	69	70	77	74	76	60	58.5	61	60	57	64	57	71.8	62

Alouatta seniculus caucensis.

	14162 ♂ o.	14165 ♂ m.	14163 ♂ o.	14164 ♂ o.	14166 ♂ y.	14168 ♂ m.	14167 ♀ o.	14170 ♀ m.	Average. 6 males.	Average. 2 females.
Total length	116.5	117.5	123.5	—	119	106	100	97	116.5	98.5
Basal length (Hensel)	97	96	104	103	86	85	81	—	95.1	81
Zygomatic breadth	80	77	82	81.5	70	67.5	69	64	76.3	66.5
Postorbital breadth	41	41	44	38	46	42	40.5	45	42	42.7
Interorbital breadth	13	11	15	14	11	12.5	13	10	12.7	11.5
Orbital breadth	67	64.5	69	68.5	64	59	58.5	54	65.3	56.22
Mastoid breadth	58	56	59	57	54	51	53	51.3	55.8	52
Palatal breadth at m^1	22	22	22	23	21.2	20	20.3	20	21.5	20
Rostral breadth	30	28.5	34	31	28.5	25	26	21	29.5	23.5
Palatal length	41	42	41	44.5	36	36	35	32	40	33.5
Postpalatal length	56	55	55.5	58	50	47	47	—	53.5	47
Front width of nasals	9.5	9	10	11	9.3	8	8	8	9.4	8
Upper premolar-molar series	36	36	36	36.5	35	35	33	31	35.7	32
Lower premolar-molar series	41.5	41	42	41.5	41	38	36.5	34	40.8	35.2
Length of lower jaw	94	94	101	99	84	80	80	71	92	75.5
Height at condyles	68	63	81	70	60	55	54	50	66	47

"Howling Monkey. — This is found both in the dry forest and mountain forest, ranging, apparently, to about 4500 feet; but it is more common near the coast. Howlers go in bands, commonly of five or six, led by an old male; they travel among the higher branches, rarely approaching the ground, and the males keep up a continuous rumbling cry, which may be heard sometimes at a distance of a mile or more. This sound is often heard at night, and it is evident that the animals travel then, though perhaps not when it is very dark.

"Of all American monkeys the howlers are the most intractable in captivity; we have tried to tame young ones, but they always showed resentment and fear, refused their food, and soon died. A *Cebus* or spider monkey, with the same treatment, becomes tame in a few days.

"The Santa Marta male howlers have the scrotum snow-white, a singular and striking sexual mark. I do not remember to have observed this in any of the Brazilian howlers, but I may have forgotten it. In other respects this species looks much like the red howler of the Amazon." — H. H. S.

77. **Aotoes lemurinus** (*Is. Geoffroy*).—Two specimens, Bonda, Nov. 18, and Valparaiso, June 29. The former, No. 14567, has been mounted, so that the skull is not available for examination; the latter, No. 15483, a young female, is much grayer and less rufous.

That the Santa Marta specimens are not *Aotoes felinus* (Spix) is evident from the color of the throat and fore neck, which is gray, in abrupt contrast with the rest of the ventral surface, instead of orange, uniform with the ventral surface, as in *A. felinus*.

The type locality of Is. Geoffroy's *Nyctipithecus lemurinus* was Santa Fé de Bogota, Colombia, and the species is represented in the Museum collection by a mounted topotype, in excellent preservation, purchased many years since from the Verreaux Brothers of Paris. Geoffroy described the species (Arch. du Mus., IV, 1844, p. 24, pl. ii), "d'après les peaux et les crânes de plusieurs individus des deux sexes et de différents ages, que le Museum d'histoire naturelle avait reçus de Santa Fé de Bogota." He noted considerable variability in

color in this series, which he considered due to individual variation, as it was evidently not sexual.

The Museum Collection contains 7 specimens from the upper Cauca Valley (alt. 6000 feet), Colombia, collected by Mr. J. H. Batty, which I also refer to *A. lemurinus*. They include adults and young adults of both sexes, but unfortunately only four of the skins are accompanied by skulls. This series is exceedingly variable in details of coloration, varying individually in the amount of rufous and black, as described by Geoffroy. Yet it is impossible not to believe that they all represent a single variable species. They show essentially a close agreement with the topotype of *A. lemurinus* in size, proportions, and in the prevailing features of coloration. No. 14567, from Bonda, can be closely matched by several specimens in the Cauca series, and is also not appreciably different from the Bogota specimen. The other (No. 15483, from Valparaiso) is paler and grayer, with the ventral surface much paler and with much less rufous suffusion pervading the general pelage. The Valparaiso specimen is much more different from the Bonda specimen than the latter is from several of the Cauca specimens, but there is one Cauca specimen which closely resembles it. With larger series from each of these three localities it might be possible to distinguish a small amount of local differentiation in color or other features, but the material at present available for examination does not warrant such procedure.

According to Mr Brown's flesh measurements of two specimens taken by him at Santa Marta, near Bonda (Bangs, Proc. New Engl. Zoöl. Club, I, p. 102), the length of the tail vertebræ is considerably greater than half the total length; in the Smith specimens and in the Batty specimens these two measurements are equal. It is probable, however, that the method of measuring was not the same in all three cases. Spix says, "cauda corpore multo longiore," while his measurements are: "trunci 1′ 1½″, caudæ, 1′ 2″" which makes a difference of only half an inch between the two measurements. Adding the head — "capitis 2⅓″" — makes the head and body longer than the tail! In other words, the commonly

assumed difference in the relative length of the tail in the two species — *A. felina* and *A. lemurina* — is erroneous.

"NOCTURNAL MONKEY. — I know nothing of these monkeys except that they are occasionally found in the dry forest, near sea-level, sleeping in hollow trees during the day; generally two or three are found together. The few specimens brought in were very fat, even the skin being so oily that it was preserved with difficulty, and we lost several. The species may be more common than it appears; it is seldom observed owing to its habits." — H. H. S.

78. **Cebus capucinus** (*Linn.*). — Thirty-two specimens, of which 27 were taken at or near Bonda, 4 at Minca, and 1 at Cacagualito. They include many adults of both sexes, as well as immature specimens of various ages. Nearly every month is represented, but they were taken mainly in March and April (5), October and November (6), and July and August (6). Even the adults are exceedingly variable in coloration, and thus conform to what other authors have written of this feature of the species.

Absence of material from Guiana, the type locality, or from any other localities, renders a comparative study of this fine series impossible.

The following external measurements are from the collector's labels, except that the head-and-body length is obtained from subtracting the tail length from the total length. As so often happens in mammals, and especially in those with long tails, the tail in the female is relatively longer than in the male.

EXTERNAL MEASUREMENT.

14620	♂	Total length,	959;	head and body,	495;	tail vertebræ,	464.
14849	♂	" "	965;	" " "	508;	" "	457.
15481	♂	" "	965;	" " "	533;	" "	432.
23392	♂	" "	1003;	" " "	508;	" "	495.
23394	♂	" "	976;	" " "	472;	" "	457.
23395	♀	" "	889;	" " "	383;	" "	504.
23396	♀	" "	895;	" " "	400;	" "	495.
23753	♀	" "	914;	" " "	519;	" "	495.
23751	♀	" "	838;	" " "	393;	" "	445.
14616	♀	" "	876;	" " "	419;	" "	457.
14617	♀ juv.	" "	832;	" " "	444;	" "	388.
14621	♀	" "	876;	" " "	441;	" "	435.

The largest male skulls have a total length of 96 to 100 mm., and a zygomatic breadth of 66 to 73; the largest female skulls, 88 to 95 by 58 to 61.

"Brown Monkey (called *Mico*). — The range is almost exactly the same as that of the howler, but the species is rather more common; it is often seen in pairs or bands of three or four. Micos are more active than howlers, taking long leaps from tree to tree; in so doing the tail is used precisely like a fifth hand, clasping the nearest branch when they alight. I have never seen these monkeys swing by their tails, though they sometimes swing by the posterior hands, using the tail as a fulcrum. But, as a rule, monkeys in the forest swing very little; they walk easily on the upper side of a branch, leaping to the nearest branch of the adjoining tree on the line of travel, or sometimes crossing by a vine-stem. They always follow a leader, presumably an old male, and they move after him in single file. Micos are very curious; if a man is passing beneath they stop to look at him, peering down through the foliage. Young ones are easily tamed, but in captivity they are mischievous and often fractious; generally they become attached to particular persons. Tame ones which we have kept slept all night, and I do not think this species travels after sunset. Micos are esteemed as food by the natives." — H. H. S.

LIBRARY OF THE UNIVERSITY OF CALIFORNIA

(*Continued from 4th page of cover.*)

Vol. IV. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Traditions of the Chilcotin Indians. By Livingston Farrand. Pp. 1–54. June, 1900. Price, $1.50.

PART II.—Cairns of British Columbia and Washington. By Harlan I. Smith and Gerard Fowke. Pp. 55–75, pll. i–v, and 9 text figures. January, 1901. Price, $1.50.

PART III.—Traditions of the Quinault Indians. By Livingston Farrand and W. S. Kahnweiler. Pp. 77–132. January, 1902. Price, $1.00.

PART IV.—Shell Heaps of the Lower Frazer River. By Harlan I. Smith. Pp. 133–190, pll. vi, vii, and 59 text figures. December, 1902. Price, $1.00.

Vol. V. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 1–270. January, 1902. Price, $3.00.

PART II.—Kwakiutl Texts. By Franz Boas and George Hunt. Pp. 271–402. December, 1902. Price, $1.50.

Vol. VI. Anthropology.

Hyde Expedition.

The Night Chant, a Navaho Ceremony. By Washington Matthews. Pp. i–xvi, 1–332, pll. i–viii (5 colored), and 19 text figures. May, 1902. Price, $5.00.

Vol. VII. Anthropology (not yet completed).

Jesup North Pacific Expedition.

PART I.—The Decorative Art of the Amur Tribes. By Berthold Laufer. Pp. 1–79, pll. i–xxxiii, and 24 text figures. January, 1902. Price, $3.00.

ETHNOGRAPHICAL ALBUM.

Jesup North Pacific Expedition.

Ethnographical Album of the North Pacific Coasts of America and Asia. Part I, pp. 1–5, pll. i–xxviii. August, 1900. Sold by subscription, price $6.00.

BULLETIN.

The matter in the 'Bulletin' consists of about twenty-four articles per volume, which relate about equally to Geology, Palæontology, Mammalogy, Ornithology, Entomology, and (in the recent volumes) Anthropology, except Vol. XI, which is restricted to a 'Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department.

Volume I, 1881–86	Price, $5.00	Volume XI, Part III, 1900	Price, $2.00
" II, 1887–90	" 4.75	" " " IV, 1901	" 1.75
" III, 1890–91	" 4.00	" " (Complete)	" 5.00
" IV, 1892	" 4.00	" XII, 1899	" 4.00
" V, 1893	" 4.00	" XIII, 1900	" 4.00
" VI, 1894	" 4.00	" XIV, 1900	" 4.00
" VII, 1895	" 4.00	" XV, Part I, 1901	" 3.00
" VIII, 1896	" 4.00	" XVI, 1902	" 5.00
" IX, 1897	" 4.75	" XVII, Part I, 1902	" 1.50
" X, 1898	" 4.75	" " " II, "	" .75
" XI, Part I, 1898	" 1.25	" XVIII, " I, "	" 2.00
" " " II, 1899	" 2.00	" XIX, 1903	" 6.00

AMERICAN MUSEUM JOURNAL.

The 'Journal' is a popular record of the progress of the American Museum of Natural History, issued quarterly. Price, $1.00 a year.

For sale by G. P. PUTNAM'S SONS, New York and London;
J. B. BAILLIÈRE ET FILS, Paris; R. FRIEDLÄNDER & SOHN, Berlin;
and at the Museum.

PUBLICATIONS

OF THE

American Museum of Natural History

The publications of the American Museum of Natural History consist of the 'Bulletin,' in octavo, of which one volume, consisting of from about 400 to 700 pages, and from about 25 to 60 plates, with numerous text figures, is published annually; and the 'Memoirs,' in quarto, published in parts at irregular intervals. Also an 'Ethnographical Album,' issued in parts, and the 'American Museum Journal.'

MEMOIRS.

Each Part of the 'Memoirs' forms a separate and complete monograph, with numerous plates.

Vol. I.

PART I.—Republication of Descriptions of Lower Carboniferous Crinoidea from the Hall Collection now in the American Museum of Natural History, with Illustrations of the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 1–37, pll. i–iii, and 14 text cuts. September 15, 1893. Price, $2.00.

PART II.—Republication of Descriptions of Fossils from the Hall Collection in the American Museum of Natural History, from the Report of Progress for 1861 of the Geological Survey of Wisconsin, by James Hall, with Illustrations from the Original Type Specimens not heretofore Figured. By R. P. Whitfield. Pp. 39–74, pll. iv–xii. August 10, 1895. Price, $2.00.

PART III.—The Extinct Rhinoceroses. By Henry Fairfield Osborn. Part I. Pp. 75–164, pll. xii*a*–xx, and 49 text cuts. April 22, 1898. Price, $4 20.

PART IV.—A Complete Mosasaur Skeleton. By Henry Fairfield Osborn. Pp. 165–188, pll. xxi–xxiii, and 15 text figures. October 25, 1899.

PART V.—A Skeleton of Diplodocus. By Henry Fairfield Osborn. Pp. 189–214, pll. xxiv–xxviii, and 15 text figures. October 25, 1899. Price of Parts IV and V, issued under one cover, $2.00.

PART VI.—Monograph of the Sesiidæ of America, North of Mexico. By William Beutenmüller. Pp. 215–352, pll. xxix–xxxvi, and 24 text cuts. March, 1901. Price, $5.00.

PART VII.—Fossil Mammals of the Tertiary of Northeastern Colorado. By W. D. Matthew. Pp. 353–447, pll. xxxvii–xxxix, and 34 text cuts. November, 1901. Price, $3.00.

PART VIII.—The Reptilian Subclasses Diapsida and Synapsida and the Early History of the Diaptosauria. By Henry Fairfield Osborn. Pp. 449–507, pl. xl, and 28 text figures. (With Contents and Index to Volume I.) November, 1903. Price, 2.00.

Vol. II. Anthropology.

Jesup North Pacific Expedition.

PART I.—Facial Paintings of the Indians of Northern British Columbia. By Franz Boas. Pp. 1–24, pll. i–vi. June 16, 1898. Price, $2.00.

PART II.—The Mythology of the Bella Coola Indians. By Franz Boas. Pp. 25–127, pll. vii–xii. November, 1898. Price, $2.00.

PART III.—The Archæology of Lytton, British Columbia. By Harlan I. Smith. Pp. 129–161, pl. xiii, and 117 text figures. May, 1899. Price, $2.00.

PART IV.—The Thompson Indians of British Columbia. By James Teit. Edited by Franz Boas. Pp. 163–392, pll. xiv–xx, and 198 text figures. April, 1900. Price, $5.00.

PART V.—Basketry Designs of the Salish Indians. By Livingston Farrand. Pp. 393–399, pll. xxi–xxiii, and 15 text figures. April, 1900. Price, 75 cts.

PART VI.—Archæology of the Thompson River Region. By Harlan I. Smith. Pp. 401–442, pll. xxiv–xxvi, and 51 text figures. (With title-page, contents, and index to Vol. II.) June, 1900. Price, $2.00.

Vol. III. Anthropology (not yet completed).

PART I.—Symbolism of the Huichol Indians. By Carl Lumholtz. Pp. 1–228, pll. i–iv, and 291 text figures. May, 1900. Price, $5.00.

PART II.—The Basketry of the Tlingit. Pp. 229–277, pll. v–xviii, and 73 text figures. July, 1903. Price, $2.00.

(*Continued on 3d page of cover.*)

UNIVERSITY OF CALIFORNIA LIBRARY,
BERKELEY

THIS BOOK IS DUE ON THE LAST DATE
STAMPED BELOW

Books not returned on time are subject to a fine of 50c per volume after the third day overdue, increasing to $1.00 per volume after the sixth day. Books not in demand may be renewed if application is made before expiration of loan period.

JUN 4 1930

JAN 8 1936

NOV 19 1937

NOV 30 1938

JUL 17 1939

AUG 8 1939

JAN 3 1944

50m-7,'29

QL701
A5
v.4
BIOLOGY
LIBRARY
G
198484
Allen